Appendix F

BIOLOGICAL EVALUATION

Activities Related to

Wildlife Habitat, Forest Management, and Roads

Stony Creek Project

USDA-Forest Service
Cherokee National Forest
Watauga Ranger District
Carter County, Tennessee

Prepared by
Marcia Carter
North Zone Fisheries Biologist
4900 Asheville Highway
Greeneville, TN 37743
(423) 638-4100
mscarter@fs.fed.us

and

Joe McGuiness
North Zone Wildlife Biologist
4400 Unicoi Drive
Unicoi, TN 37692
(423) 735-1500
jmcguiness@fs.fed.us

June19, 2013

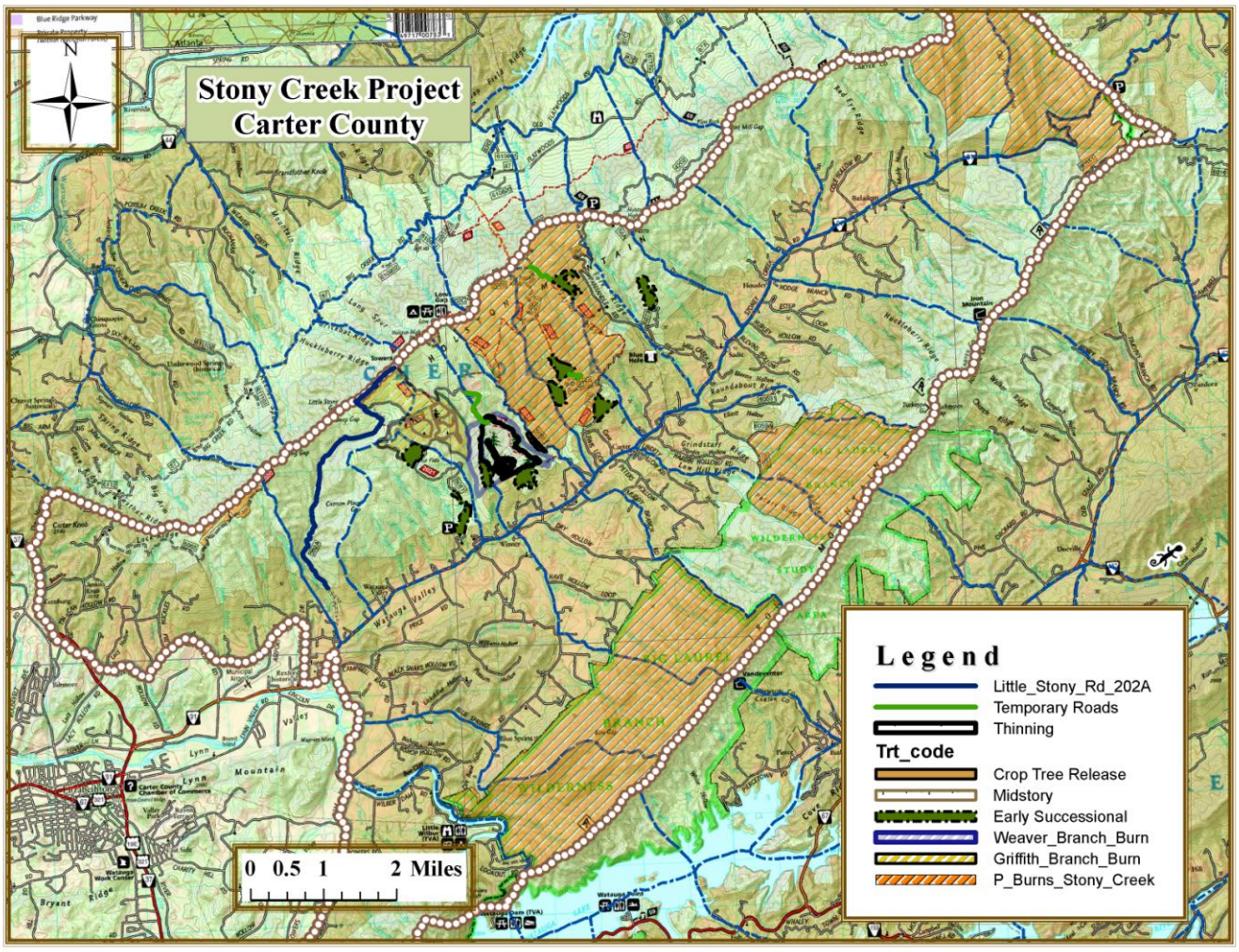
TABLE OF CONTENTS

1.0 INTRODUCTION

The purpose of this biological evaluation (BE) is to document any potential effects of the project on sensitive species or their habitat, and to ensure land management decisions are made with the benefit of such knowledge. The Forest Service has set forth guidance in FSM 2670 which is designed to ensure that Forest Service actions (1) do not contribute to the loss of viability of any native or desired non-native species or cause a trend toward federal listing for any species; (2) provide a process and standard which ensures that sensitive species receive full consideration in the decision making process.

1.1 AFFECTED AREA AND SCOPE OF ANALYSIS

Figure 1. Stony Creek Project Area Map



The **scope of analysis** for available habitat, direct, indirect, and cumulative effects on Sensitive species includes the Stony Creek watershed of Carter County, Tennessee. The timeframe

considered for cumulative effects is the past five years to the future five years. The **affected area** (Figure 1) includes portions of Compartments 66-69 and 71-73. Effects of road authorization in Compartments 55, 58, 59, and 60 will also be considered. Viability of each species across the entire Cherokee National Forest (CNF) is also considered in making the Determination of Effect.

TABLE 1. ACTIVITIES CONSIDERED IN CUMULATIVE EFFECTS ANALYSIS

Activity	Acres	Past 5 years	Future 5 Years
Rye Patch Knob Burn	2,613	No	Yes
Lindy Camp Burn	348	No	Yes
Old Road Ridge Burn	2,272	No	Yes
Big Gap Burn	135	Yes	No

The Stony Creek analysis area includes about 29,204 acres of Forest Service land. Approximately 11,921 acres of the analysis area are within the Big Laurel Branch Wilderness and Study Area. Aquatic habitats in the affected areas include 9 cold headwater streams: Bartee Branch, Furnace Branch, Griffith Branch, Hinkle Branch, Laurel Branch, Little Stony Creek, Left Fork Mill Creek, Right Fork Mill Creek, and Miller Branch. Elevations of affected areas range from 1,920 to 4,320 feet MSL. No northern hardwood forest occurs in or near any affected areas. The slopes in the affected areas are mostly southerly facing slopes. Table 1 lists the terrestrial habitats available on Forest Service land in the project area.

TABLE 2. TERRESTRIAL HABITATS OF THE STONY CREEK ANALYSIS AREA

Major Forest Communities	Acres	Percent of Area
Mesic deciduous (MDF)	16,557	57%
Eastern Hemlock/White Pine (EHWP)	197	1%
Oak & oak-pine (OOPF)	21,076	72%
Successional Habitats	**Acres**	**Percent of Area**
Early successional (ESF)	0	0%
Sapling/pole (SPF)	1,522	5%
Mid-successional (MSF)	2,118	7%
Late-successional & old growth (LSOG)	25,323	87%
Other Terrestrial Habitats	**Acres**	**Percent of Area**
Permanent openings (PO)	234	1%
High elevation shrubby habitats (HESH)	75	0%
Snags, dens, downed wood (SDDW)	27,441	94%

1.2 PROPOSED ALTERNATIVES

ALTERNATIVE A (NO ACTION)

No projects would be implemented in the project area at this time. Current uses of the area would continue until such uses were prohibited by changed environmental conditions. Selection of Alternative A does not preclude future analysis or implementation of on-going management proposals within the project area.

ALTERNATIVE B

Activities proposed in Alternative B are listed in Table 3. **Early successional habitat** (ESH) treatments would be created utilizing commercial timber harvest and non-commercial regeneration. Commercial harvest stands would be regenerated through the shelterwood method. All early successional stands would require the following treatments:

- Pre-harvest site preparation: Midstory species would be controlled with herbicide (Imazapyr and Glyphosate) to reduce post-harvest sprouting of overly-competitive species.
- Mast tree seedling plantings (*Early Successional Only*): Seedlings of mast-producing tree species would be planted in regenerated areas to augment natural reproduction.
- Post-harvest treatments: One-two years after harvest, use chainsaw slashdown or herbicide (Imazapyr and Glyphosate), and two-four years after harvest, use herbicide (Triclopyr) to reduce competitive sprouts. At age 10, slashdown to release mast-producing trees.

Maintain existing roads and create temporary roads: Existing roads would be maintained, and temporary roads would be constructed in support of timber sale activities. Temporary roads would be closed after the timber sale.

Improve Wildlife Habitat conditions after harvest: place bat roost and bird/mammal nest boxes (Years 1-3); construct waterholes/vernal ponds (Years 1-2); provide nest platforms (Years 3-4); convert temp road and landings to wildlife openings (Years 1-2).

Authorize roads as recommended in the Stony Creek Travel Analysis Process Report (2010).

TABLE 3. PROPOSED ACTIVITIES IN ALTERNATIVE B

Action	Habitat/Forest	Successional Stage	# Stands	Area
Site Prep/Shelterwood (S)	Deciduous & White Pine-Hemlock	Mid to Late	10	351 acres
Non-commercial Regeneration	Deciduous	Late	1	32 acres
Post-Harvest Treatments (S & T)	Deciduous & White Pine-Hemlock	Early	11	383 acres
Mast Tree planting (S)	Deciduous & White Pine-Hemlock	Early	11	383 acres
Crop Tree Release	Deciduous Forest	Sapling to Late	2	13 acres
Nest/Roost Boxes	Deciduous & White Pine-Hemlock	Early	9-18	18 boxes
Waterholes	Deciduous Forest/Openings	Early to Late	2	2 ponds
Grouse Drumming Logs	Deciduous Forest	-	-	45 logs
Road Maintenance	Mixed Forest	Mixed	-	6.3 miles
Temporary Road Construction	Deciduous Forest	Early to Late	-	1.5 miles
Authorize Existing Roads	-	-	-	8.2 miles

ALTERNATIVE C

Activities proposed are listed in Table 2. **Early successional habitat** (ESH) would be created using commercial timber harvest (shelterwood) and non-commercial regeneration. An average basal area of 15-25 ft^2/acre of shelterwood reserve trees would be left on site to create a two-aged stand structure along with new regeneration. **Thinning** stands (commercial) would restore upland oak and shortleaf pine. Final basal area (BA) would range from 35-60 ft^2/acre, removing damaged and disease trees first, then scarlet and black oak, red maple, and white pine. Reserve trees in both

treatment types would include dens, large mast producing trees, and yellow pine. All early successional and thinned stands would require pre- and post-harvest treatments:

Pre-harvest site preparation: Midstory species would be controlled with herbicide (Imazapyr and Glyphosate) to reduce post-harvest sprouting of overly-competitive species.

Mast tree seedling plantings: Seedlings of mast-producing tree species would be planted in regenerated areas to augment natural reproduction.

Post-harvest treatments: One-two years after harvest, use chainsaw slashdown or herbicide (Imazapyr and Glyphosate), and two-four years after harvest, use herbicide (Triclopyr) to reduce competitive sprouts. At age 10, slashdown to release mast-producing trees or shortleaf pine.

Crop tree release around selected mast-producing trees would be implemented using chainsaws. **Midstory** treatments with herbicide would reduce the stocking density of understory and midstory trees.

Prescribed burns (low-intensity) would be conducted using existing roads, streams, dozer and hand tools for control lines. If the burn objectives were not fully met, a follow-up burn would be conducted and may continue on a two to ten-year rotation.

Wildlife Habitat Improvements after harvest would include bat roost and nest boxes (Years 1-3); construct vernal ponds (Years 1-2); provide grouse drumming logs (Years 3-4); convert temporary road and landing to wildlife openings (Years 1-2).

Maintain existing roads and create temporary roads: Existing roads would be maintained, and temporary roads would be constructed in support of timber sale activities. Temporary roads would be closed after the timber sale. Authorize roads as recommended in the Stony Creek Travel Analysis Process Report (2010).

Little Stony Road: Decommission road along stream and convert portions to trail. Remove bridge, stabilize banks and stream crossings, install water diversions, obliterate and re-contour sections (0.65 mile), and remove illegal structures. Reroute portion of trail, (500 feet), construct new connector trail (0.6 mile), and create small parking area (0.1 acre).

TABLE 4. PROPOSED ACTIVITIES IN ALTERNATIVE C

Action	Habitat	Successional Stage	# Stands	Area
Shelterwood Harvest	Deciduous & White Pine-Hemlock Forest	Mid to Late	10	303 acres
Non-commercial Regeneration	Deciduous Forest	Late	1	32 acres
Thinning	Deciduous Forest	Sapling/Pole to Late	6	204 acres
Pre-Harvest Site Preparation	Deciduous & White Pine-Hemlock Forest	Early	17	539 acres
Post-Harvest Treatments	Deciduous & White Pine-Hemlock Forest	Early	17	539 acres
Mast Tree or shortleaf pine planting	Deciduous & White Pine-Hemlock Forest	Early	Up to 17	Up to 539 acres
Crop Tree Release	Deciduous Forest	Sapling/Pole to Late	2	13 acres
Midstory	Deciduous Forest	Sapling/Pole to Late	3	116 acres
Prescribed burns	Mixed Forest	Sapling/Pole to Late	2 burns	1,057 acres
Little Stony Road Decommission	Riparian Forest & Stream Crossings	Mid to Late	-	5 miles

Action	Habitat	Successional Stage	# Stands	Area
Nest/Roost Boxes	Deciduous & White Pine-Hemlock Forest	Early	9- 17	18 boxes
Waterholes	Deciduous Forest/ Permanent Openings	Early to Late	5	5 ponds
Grouse Drumming Logs	Deciduous Forest	-	-	45 logs
Road Maintenance	Mixed Forest	Mixed	-	6.3 miles
Temporary Road Construction	Deciduous Forest	Early to Late	-	1.3 miles
Authorize Existing Roads	-	-	-	8.2 miles

DESIGN CRITERIA

Specific actions will be incorporated into the project design and implementation.

1. Use broad-based dips or water bars on all access ways on non-level slopes.
2. Use a hydrologist or wildlife biologist to assist in the location of ephemeral pools, springs, and seeps.
3. Implement Tennessee Best Management Practices (BMPs) as a minimum to achieve soil and water quality objectives. When RLRMP Standards exceed BMPs, the standards shall take precedence over Tennessee BMPs.
4. Streamside management zones (riparian corridors and filter zones) would be established, as specified in the RLRMP.
5. Any new threatened, endangered, and/or sensitive species locations discovered within a project area may result in all actions being delayed or interrupted within the area. The appropriate district wildlife/fisheries biologist or botanist would be consulted to determine effects of the action on the species.
6. Trees known to have been used as roosts by Indiana bats are protected from cutting and/or modification until they are no longer suitable as roost trees unless necessary for public safety. Consultation with the US Fish and Wildlife Service (FWS) must occur before cutting or modification.
7. To avoid injury to young Indiana bats, prescribed burning of potential maternity roosting habitat between May 1 and August 15 is prohibited, unless otherwise determined by consultation with the FWS.
8. Snags with exfoliating bark are not intentionally felled unless necessary for public safety. Exceptions may be made for small-scale projects such as insect/disease control, salvage harvesting, and facility construction.
9. During all silvicultural treatments in hardwood forest types, retention priority is given to the largest available trees that exhibit characteristics favored by roosting Indiana bats.
10. Leave (reserve) areas and exclusions would be established, where necessary to minimize impacts to rare species. All ground-disturbing activities (temporary roads, landings, skid trails, etc.) and timber harvest would be excluded from within the reserve areas.
11. Mixing-water for herbicide use would be brought to the site by work crews and not obtained from streams or other bodies of water.
12. No herbicide would be applied within 30 feet of open water except for selective treatments that use herbicides labeled for aquatic use.

13. Off-road equipment would be cleaned of seeds, soil, vegetative matter, and other debris that could hold NNIS seeds and/or propogules. Off-road equipment would be inspected by a Forest Service representative to prevent NNIS introduction or spread in the project areas.
14. Build the fewest skid trails, logging roads, and log landings as feasible.
15. Skid trails would be placed and rehabilitated in a way that limits the spread of existing non-native invasive species from roads, trails, or powerline corridors, into stand interiors. Skid trails and plow lines would be rehabilitated (re-contoured, seeded, etc.) after they are no longer needed.
16. Any cultural resource sites found during implementation of the project would be reported immediately to a Forest Service Archaeologist and work would stop in the area.
17. Skid trails and temporary roads for the purpose of timber harvest would not be constructed for sustained distances over 200 feet in areas with slopes of 40% or greater ("steep area"). The 200-foot length can be exceeded however where the skid trail and/or temporary road is needed to traverse a steep area in order to access the remaining harvest unit(s). Trees within the traversed steep area would not be harvested, except where possible through cable winching to equipment placed outside the steep area.
18. Blend the visual impacts of roads and skid trails so they remain subordinate to the existing landscape character in size, form, line, color, and texture.
19. Orient openings to blend with the existing landscape characteristics, based on existing vegetation patterns, contours and other natural-appearing features.
20. Shape and feather unit boundaries to avoid straight edges.
21. Retain natural-appearing tree groupings.
22. Minimize the exposure of mineral soils during construction of skid roads and trails, and revegetate cut-and-fill slopes to the extent possible.
23. Screen log landings from view, and restore as close to the original contour as possible.
24. Minimize impacts to existing trails and travelways, and maintain the visual character in the vicinity of trail corridors and travelways.

2.0 SPECIES EVALUATED AND METHODS USED

This BE addresses Sensitive species that are considered to occur or have habitat on the CNF. Analysis of the project was conducted using the best available science, including references from science-based websites, books, papers, and reports. Information from field surveys and TES database maps identified T&E species known to occur in the project area. Project area habitat and species habitat requirements, distributions and limiting factors were used to determine if additional T&E species were likely to occur in the project area.

The 2001 Cherokee National Forest Sensitive Species List was reviewed to determine species to consider. Each species, listed in Attachment A, was evaluated and given a Project Review Code (PRC) using a list (Attachment B) for evaluation. This process, used to decide when to inventory for T&E species, is consistent with FSM 2672.43. Some of the PRC's are used for a Determination of Effect (see Attachment B). Based on this process, the following species (Table 4) are analyzed for effects.

TABLE 4. SENSITIVE SPECIES ANALYZED FOR EFFECTS

Scientific Name	Common Name	Group
Speyeria diana	Diana fritillary	Insect
Myotis leibii	Eastern small-footed bat	Mammal
Paravitrea placentula	Glossy supercoil	Snail
Ventridens coelaxis	Bidentate dome	Snail
Vertigo bollesiana	Delicate vertigo	Snail
Vertigo clappi	Cupped vertigo	Snail
Gentiana austromontana	Appalachian gentian	Plant
Helianthus glaucophyllus	Whiteleaf sunflower	Plant
Prenanthes roanensis	Roan Mountain rattlesnake Root	Plant
Tsuga caroliniana	Carolina Hemlock	Plant

Bat surveys were conducted in six locations across the analysis area during the Bat Blitz of 2007, including three sites near proposed activities. Fish surveys were conducted in streams from 2003 to 2012. Botanical surveys including bryophytes and vascular plants were conducted in the proposed treatment areas in 2012 (Leftwich et al. 2012, Stoehrel 2012) and 2013 (Stoehrel 2013, and Stoehrel and McGuiness 2013a-c).

3.0 HABITAT RELATIONSHIPS, EFFECTS ANALYSIS, AND DETERMINATIONS OF EFFECTS

3.1 DIANA FRITILLARY (*Speyeria diana*)

HABITAT RELATIONSHIPS

Diana fritillary is primarily found in the mountains from central Virginia and West Virginia to north Georgia and Alabama. It is more abundant from southwestern Virginia to the Great Smokies region and rare and sporadic elsewhere. It apparently underwent a major range wide decline in the past resulting in a substantial loss of its historic range. However, it may be increasing in areas where second growth forests are becoming mature, and where gypsy moth spraying is not widespread (NatureServe 2012).

Breeding habitat in most of the range consists of deciduous or mixed forests with abundant violets in the understory. The larvae hatch in the fall, over-winter as caterpillars, and begin feeding on violets in early spring. Adults feed on nectar from flowers in open areas and are also found on scat and moist soil. Because adults and larvae require different types of habitat in substantial amounts, the home ranges of these butterflies require large areas of land with diverse habitats (NatureServe 2012). Dianas occur across the northern CNF, having been observed by district biologists in at least 56 locations in recent years. Diana fritillaries have been found in the analysis area and habitat occurs in the affected area.

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

This alternative would have no direct effects on Diana Fritillary because the actions would be deferred. Dianas would be indirectly impacted because habitat diversity would decline over the

next five years as forests matured into the later age classes, reducing the amount of adult nectaring/foraging habitat. Alternative A would have no cumulative impacts on Dianas because actions would be deferred.

DETERMINATION OF EFFECT

Alternative A ***may impact individuals but is not likely to cause a trend toward federal listing or loss of viability*** on Diana fritillary.

ALTERNATIVE B

DIRECT AND INDIRECT EFFECTS

Adults and caterpillars may be impacted during creation of ESH and thinning. Road construction, tree felling, and skidding may damage or destroy caterpillars on the ground and/or adults roosting in trees. However, these direct effects would be short-term, occurring only during the duration of the activities and would be limited to the action areas. Because habitat is found in over half of the analysis area, the majority of the local populations would not be impacted. Compliance with RLRMP standards, including the stream filter zones, would protect individuals in riparian areas from harm.

This alternative would indirectly affect caterpillar habitat. Creation of ESH in mature MDF would increase sunlight to the forest floor, decreasing conditions for the growth of violets, the primary food source (host plant) for the species. As the forest regenerated and post-harvest treatments thinned the re-growth, host plant habitat conditions would become more favorable within five years. However, conditions may not be optimal until the forest matured. Crop tree release would not alter habitat conditions for caterpillars or their host plant to any degree. Caterpillar habitat would be reduced by less than one percent across the analysis area. Breeding and caterpillar habitat would remain abundant (66 percent of CNF lands) in the analysis area.

The increased sunlight from the creation of ESH would be beneficial for nectaring adults by promoting the growth of flowering plants for five to ten years post-harvest. Crop tree release would still allow for shaded conditions, and may encourage flowering plant abundance and diversity for nectar gathering over time. The amount of adult foraging habitat would likely increase in the analysis area.

Herbicides used in treatments are not likely to come directly in contact with the butterflies, but may come in contact with caterpillars and be on food sources that are ingested (plants). The herbicides used appear to be relatively non-toxic for invertebrates (Tu et al 2001 and SERA); although very little information is available for insects. Herbicides would be used across 264 acres of habitat, but only a portion of the acres treated would be directly impacted. The following factors would minimize the risk of contamination: 1) herbicide applied in small amounts; 2) specific methods of application such as thinline or stump treatments; 3) design criteria for herbicide use, e.g. timing to avoid rainfall.

Less than one acre of caterpillar habitat would be destroyed due to temporary road construction; negative impacts would be short term. Road maintenance, authorization, waterhole construction, and grouse drumming log installation would have no impact on Dianas. A diverse forested landscape would ensure that the viability of this Diana population butterfly on the CNF.

CUMULATIVE EFFECTS

Cumulative effects of past and future burning, combined with the activities proposed in this project would be negative to caterpillars but beneficial to adults. However, the negative effects from burning would be relatively short-term and should not result in a long-term loss of habitat. The project would have a positive cumulative effect on Diana fritillary by creating more open habitat and improving habitat diversity. Diana fritillary is abundant in some areas where prescribed burning has been taking place on a three to five year rotation since 1995. These effects would not contribute to the decline of this species or its habitat across the CNF.

DETERMINATION OF EFFECT

Alternative B ***may impact individuals but not likely to cause a trend to federal listing or loss of viability*** on Diana fritillary.

ALTERNATIVE C

DIRECT AND INDIRECT EFFECTS

Adults and caterpillars may be impacted during creation of ESH. Road construction, burning, tree felling, and skidding may damage or destroy caterpillars on the ground and/or adults roosting in trees. However, these direct effects would be short-term, occurring only during the duration of the activities and would be limited to the action areas. Because habitat is found in over half of the analysis area, the majority of the local populations would not be impacted. Compliance with RLRMP standards, including the stream filter zones, would protect individuals in riparian areas from harm.

This alternative would indirectly affect caterpillar habitat. Creation of ESH and thinning in mature MDF would increase sunlight to the forest floor, decreasing conditions for the growth of violets, the primary food source (host plant) for the species. As the forest regenerated and post-harvest treatments thinned the re-growth, host plant habitat conditions would become more favorable within five years. However, conditions may not be optimal until the forest matured. Crop tree release would not alter habitat conditions for caterpillars or their host plant to any degree. Caterpillar habitat would be reduced by less than one percent across the analysis area. Breeding and caterpillar habitat would remain abundant (66 percent of CNF lands) in the analysis area.

The increased sunlight from the creation of ESH and thinning would be beneficial for nectaring adults by promoting the growth of flowering plants for five to ten years post-harvest. Crop tree release and midstory treatments would still allow for shaded conditions, and may encourage flowering plant abundance and diversity for nectar gathering over time. The amount of adult foraging habitat would likely increase in the analysis area.

Herbicides used in treatments are not likely to come directly in contact with the butterflies, but may come in contact with caterpillars and be on food sources that are ingested (plants). The herbicides used appear to be relatively non-toxic for invertebrates (Tu et al 2001 and SERA); although very little information is available for insects. Herbicides would be used across 655 acres of habitat, but only a portion of the acres treated would be directly impacted. The following factors would minimize the risk of contamination: 1) herbicide applied in small amounts; 2) specific methods of application such as thinline or stump treatments; 3) design criteria for herbicide use, e.g. timing to avoid rainfall.

Diana larvae would be hibernating in the moist cove forests when burning is implemented. Fire

generally burns in a mosaic pattern leaving patches of cove forests untouched (Sellers 2009). Larvae in cove forests could be directly impacted by burning. The remaining individuals within and adjacent to the burned areas would repopulate the area over time, but it is not known how long that would take. Although burning would have negative direct effects, it would also have beneficial indirect effects. In some areas more open conditions would be created, making conditions more suitable for Diana breeding habitat. Burning would also improve foraging habitat for adult Dianas by increasing light conditions and flower production (NatureServe 2012). These impacts would be short-term and the population would persist in the area.

Less than one acre of caterpillar habitat would be destroyed due to temporary road construction; negative impacts would be short term. Wildlife opening creation would have some beneficial indirect effects to adults, by providing additional nectaring areas in the future. Road maintenance, authorization, and decommissioning, trail relocation, waterhole construction, and grouse drumming log installation would have no impact on Dianas. A diverse forested landscape would ensure that the viability of this Diana population butterfly on the CNF.

CUMULATIVE EFFECTS

Past and future prescribed burning would have the same effects as described above. Cumulative effects of burning, combined with the activities proposed in this project would be negative to caterpillars but beneficial to adults. However, the negative effects from burning would be relatively short-term and should not result in a long-term loss of habitat. The project would have a positive cumulative effect on Diana fritillary by creating more open habitat and improving habitat diversity. Diana fritillary is abundant in some areas where prescribed burning has been taking place on a three to five year rotation since 1995. These effects would not contribute to the decline of this species or its habitat across the CNF.

DETERMINATION OF EFFECT

Alternative C ***may impact individuals but not likely to cause a trend to federal listing or loss of viability*** on Diana fritillary.

3.2 EASTERN SMALL-FOOTED BAT (*Myotis leibii*)

HABITAT RELATIONSHIPS

Eastern small-footed bat is moderately widespread with spotty distribution from southeastern Canada to Alabama and Georgia, west to Oklahoma. In summer they roost in rock outcrops and cliffs, rock crevices, caves, mines, bridges, trees, and buildings. Rocky areas or bridges with a sunny exposure in forested landscapes may be important maternity site features. These bats hibernate singly or in small groups only in coldest periods of winter and early spring in caves, mines, and buildings (Harvey, et al 1999). The species typically forages over streams, ponds, roads, and waterholes (NatureServe 2012).

Forest-wide sampling from 1990 to 2011 captured over 3,213 bats, documenting 157 small-footed bats and several maternity colonies spread across most counties of the CNF. Bat surveys were conducted in six locations across the analysis area during the Bat Blitz of 2007, including three sites near proposed activities. No eastern small-footed bats were detected. Foraging and roosting habitats for the species are present across the analysis area. Talus slopes that could provide maternity roost habitat are present in four affected stands.

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

This alternative would have no direct, indirect, or cumulative effects on Eastern small-footed bat because the actions would be deferred.

DETERMINATION OF EFFECT

This alternative would have ***no impact*** on Eastern small-footed bat.

ALTERNATIVE B

DIRECT AND INDIRECT EFFECTS

Eastern small-footed bats could be directly affected by this alternative. If individuals are present in during creation of ESH, the activities may disturb, injure, or cause direct mortality to bats roosting in trees that are cut or pushed over. Road construction across a talus slope in Compartment 68 could adversely impact individuals if a maternity roost is present and activities occur during summer months. Maternity roosts could be disturbed during harvesting activities in four stands with rocky habitats, causing adults to leave their roosts temporarily. These impacts would be short-term and most maternity roost habitat would be protected by designated leave areas.

The proposed project would indirectly affect Eastern small-footed bat by alteration of roosting and foraging habitat. Removal of trees during harvest and road construction would contribute to the loss of future roosting habitat (standing snags would be retained). The 15-20 basal area per acre (BA) remaining after harvest would ensure that roosting habitat would continue to be available in harvested stands over the next five years. The RLRMP requires the largest trees with favorable conditions for roosting bats to be left. It also requires retention of all shagbark hickory trees (>6 inch diameter) and snags with exfoliating bark. New snags would develop from trees damaged during harvest, creating roosting habitat in the future. Installation of bat boxes would also provide additional roosting habitat. The overall effect of these harvest activities would provide open patches of forest with standing snags for roosting. The open condition of these areas would make roosting habitat more suitable by providing more sunlight to maintain warmer conditions in the roost.

Creation of early successional habitat and crop tree release would increase light intensity and herbaceous plant diversity for the next five to ten years. This would increase insect production and improve forage conditions for bats. Construction of vernal ponds would supply upland water sources and improve foraging conditions.

The herbicides used for post harvest treatments are unlikely to contact bats directly, but may be present in trace amounts on insects. The herbicides used are of low toxicity to mammals (Tu et al 2001). Herbicides would be used across 383 acres, but only a portion of the acres treated would be directly impacted. The following factors would minimize the risk of contamination: 1) herbicide applied in small amounts; 2) specific methods of application such as thinline or stump treatments; 3) design criteria for herbicide use, e.g. timing to avoid rainfall. Crop tree release, road maintenance, and authorization and grouse drumming log installation would have no impact on Eastern small-footed bats.

CUMULATIVE EFFECTS

Snags would be lost and created during future burns. Future burns would not affected maternity

roosts so would not be cumulative with effects from this alternative. The cumulative effect of these activities would be a more open and diverse forest with abundant snags. By continuing to protect and provide an abundance of snags, populations of these species would not decline as a result of this alternative.

DETERMINATION OF EFFECT

Alternative B ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Eastern small-footed bats.

ALTERNATIVE C

DIRECT AND INDIRECT EFFECTS

Eastern small-footed bats could be directly affected by Alternative C. If individuals are present in during creation of ESH and thinning, the activities may disturb, injure, or cause direct mortality to bats roosting in trees that are cut or pushed over. Road construction across a talus slope in Compartment 68 could adversely impact individuals if a maternity roost is present and activities occur during summer months. Maternity roosts could be disturbed during harvesting activities in four stands with rocky habitats, causing adults to leave their roosts temporarily. These impacts would be short-term and most maternity roost habitat would be protected by designated leave areas.

The proposed project would indirectly affect Eastern small-footed bat by alteration of roosting and foraging habitat. Removal of trees during harvest, temporary road construction, trail construction, and road obliteration/recontouring would contribute to the loss of future roosting habitat (standing snags would be retained). The 15-20 basal area per acre (BA) remaining in early successional areas and 35-60 BA in the thinned area would ensure that roosting habitat would continue to be available in harvested stands over the next five years. The RLRMP requires the largest trees with favorable conditions for roosting bats to be left. It also requires retention of all shagbark hickory trees (>6 inch diameter) and snags with exfoliating bark. New snags would develop from trees damaged during harvest, creating roosting habitat in the future. Installation of bat boxes would also provide additional roosting habitat. The overall effect of these harvest activities would provide open patches of forest with standing snags for roosting. The open condition of these areas would make roosting habitat more suitable by providing more sunlight to maintain warmer conditions in the roost.

Creation of early successional habitat, thinning, midstory, and crop tree release would increase light intensity and herbaceous plant diversity for the next five to ten years. Conversion of a temporary road and log landing to a wildlife opening would increase open conditions, plant diversity, and create travel corridors. These activities would increase insect production and improve forage conditions for bats. The creation of wildlife openings would provide a permanent source for quality foraging areas. Construction of vernal ponds would supply upland water sources and improve foraging conditions.

The herbicides used for post harvest and midstory treatments are unlikely to contact Indiana bats directly, but may be present in trace amounts on insects. The herbicides used are of low toxicity to mammals (Tu et al 2001). Herbicides would be used across 681 acres, but only a portion of the acres treated would be directly impacted. The following factors would minimize the risk of contamination: 1) herbicide applied in small amounts; 2) specific methods of application such as thinline or stump treatments; 3) design criteria for herbicide use, e.g. timing to avoid rainfall. Crop

tree release, road maintenance, authorization, and decommissioning, trail relocation, and grouse drumming log installation would have no impact on Eastern small-footed bats.

CUMULATIVE EFFECTS

Snags would be lost and created during past and future burns. Prescribed burns would not affect maternity roosts so these activities would not be cumulative with effects from this alternative. The cumulative effect of these activities would be a more open and diverse forest with abundant snags. By continuing to protect and provide an abundance of snags, populations of these species would not decline as a result of this alternative.

DETERMINATION OF EFFECT

Alternative C may ***impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Eastern small-footed bats.

3.3 GLOSSY SUPERCOIL (*Paravitrea placentula*), BIDENTATE DOME (*Ventridens coelaxis*), DELICATE VERTIGO (*Vertigo bollesiana*), AND CUPPED VERTIGO (*Vertigo clappi*)

HABITAT RELATIONSHIPS

GLOSSY SUPERCOIL

Glossy supercoil occurs under leaf litter on wooded hillsides and ravines in Virginia, Kentucky, Tennessee, and North Carolina (Mitchell 2001). On the CNF it is known from 6 sites in Polk, Monroe, Cocke, Carter, and Sullivan counties. The species is known from mixed mesophytic and dry to mesic oak forests beneath leaf litter, downed wood, and small stones. Specific forest types include acidic and rich cove, high elevation northern red oak, and montane oak hickory forests (Caldwell 2004).

BIDENTATE DOME

Bidentate dome occurs in Virginia, Kentucky, Tennessee, and North Carolina (NatureServe 2012). Five records of this snail on the CNF occur in Carter County and three in Johnson County. This species occurs in mid to high elevation mixed mesophytic forests, dry to mesic oak forests, and conifer northern hardwood forests; specific forest types include rich cove and possibly acidic cove, white pine-hemlock-hardwood, high elevation northern red oak, and montane oak hickory forests (Caldwell 2004).

DELICATE VERTIGO

Delicate vertigo is found scattered from Maine west to Minnesota, and south to Tennessee and North Carolina (NatureServe 2012). It has been recorded in three locations in Monroe and Johnson Counties of the CNF. This snail is found in marshes, on cold talus slopes and cliffs, and beneath leaf litter on wooded hillsides (NatureServe 2012).

CUPPED VERTIGO

Cupped vertigo is found on steep, often north facing slopes with mixed woodlands, boulders and rock outcrops. The range of this snail includes Kentucky, Tennessee, Virginia, and West Virginia (NatureServe 2012).

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

This alternative would have no direct, indirect, or cumulative effects on these snails because the actions would be deferred.

DETERMINATION OF EFFECT

Alternative A would have ***no impact*** on glossy supercoil, bidentate dome, delicate vertigo, and cupped vertigo.

ALTERNATIVE B

DIRECT AND INDIRECT EFFECTS

Glossy supercoil, bidentate dome, delicate vertigo, and cupped vertigo may be directly impacted (relocated or crushed) during creation of ESH, road construction, and waterhole construction, particularly during tree felling and moving soil with heavy equipment. Any direct effects would be short-term, occurring only during the duration of the activities and limited to the activity area. Individuals in underground retreats, at the base of trees, and under large logs would be protected from direct impacts. Compliance with RLRMP standards, including the stream filter zones, would protect individuals in riparian areas from harm. Habitat for the species is scattered throughout the analysis area, and the majority of the populations would not be impacted.

Negative and long-term indirect effects would occur in potential habitat. ESH creation would increase sunlight to the forest floor causing leaf litter to dry out, and increased surface temperatures. This may cause snails to relocate to more moist conditions in adjacent stands. However, snails are able to survive dry periods, sometimes for years (Burch and Pearce 1990). Habitat would remain in ESH in the form of underground retreats, slash piles, and logs. By protecting them from dry conditions and predators, refugia are the most important limiting factor for these animals (Burch and Pearce 1990). Over the years, canopy cover would increase to more suitable conditions, and the snails should return to the area. Crop tree release would still provide shaded conditions and would not affect habitat to any degree. Because of the abundance of habitat remaining after project implementation, snail populations would persist in the analysis area.

The herbicides used for post –cutting are not likely to come in direct contact with snails, but may be present on food sources (plants). Although little to no information is available for herbicide toxicity to terrestrial snails, the herbicides used appear to be relatively non-toxic for invertebrates (Tu et al 2001 and SERA). Herbicides would be used across 383 acres, but only a portion of the acres treated would be directly impacted. The following factors would minimize the risk of contamination: 1) herbicide applied in small amounts; 2) specific methods of application such as thinline or stump treatments; 3) design criteria for herbicide use, e.g. timing to avoid rainfall. No other activities planned in this alternative would impact terrestrial snails.

Less than three acres of habitat would be lost where temporary road construction occurs; negative impacts would be short term for temporary roads. Road maintenance would have some beneficial indirect effects; the addition of limestone gravel on the roads would provide an additional source of calcium for shell production (Burch and Pearce 1990). After implementation, the snails would use the area again. Installation of wildlife logs would provide cover for these snails. Waterhole construction, nest box installation, and other road activities would not cause any impacts.

CUMULATIVE EFFECTS

Combined with past and future burning activities, this alternative would have a negative cumulative effect on these snails. Burning would temporarily decrease suitable habitat in the analysis area.

Prescribed fires generally burn in a mosaic pattern, thereby retaining suitable habitat for the species' recolonization of the burn areas over the long term. Burning combined with the proposed ESH would decrease suitable habitat in the analysis area due to the loss of large woody debris (cover), shading, increased sunlight, and elevated temperatures on the forest floor. Habitat would remain widely available in adjacent stands and across the analysis area and populations would persist, so these negative cumulative effects would not contribute to the decline of these species or their habitats across the CNF.

DETERMINATION OF EFFECT

Implementation of Alternative B ***may impact individuals but not likely to cause a trend to federal listing or loss of viability*** of glossy supercoil, bidentate dome, delicate vertigo, and cupped vertigo.

ALTERNATIVE C

DIRECT AND INDIRECT EFFECTS

Glossy supercoil, bidentate dome, delicate vertigo, and cupped vertigo may be directly impacted (relocated or crushed) during creation of ESH, thinning, road construction, and waterhole construction, particularly during tree felling and moving soil with heavy equipment. Any direct effects would be short-term, occurring only during the duration of the activities and limited to the activity area. Individuals in underground retreats, at the base of trees, and under large logs would be protected from direct impacts. Compliance with RLRMP standards, including the stream filter zones, would protect individuals in riparian areas from harm. Habitat for the species is scattered throughout the analysis area, and the majority of the populations would not be impacted.

Negative and long-term indirect effects would occur in potential habitat. ESH creation would increase sunlight to the forest floor causing leaf litter to dry out, and increased surface temperatures. This may cause snails to relocate to more moist conditions in adjacent stands. However, snails are able to survive dry periods, sometimes for years (Burch and Pearce 1990). Habitat would remain in ESH in the form of underground retreats, slash piles, and logs. By protecting them from dry conditions and predators, refugia are the most important limiting factor for these animals (Burch and Pearce 1990). Over the years, canopy cover would increase to more suitable conditions, and the snails should return to the area.

Thinning would have less of an impact on snail habitat than shelterwood harvest because a more shaded conditions would remain in the thinned stands. Midstory treatments and crop tree release would still provide shaded conditions and would not affect habitat to any degree. Because of the abundance of habitat remaining after project implementation, snail populations would persist in the analysis area.

The herbicides used for post –cutting and midstory treatments are not likely to come in direct contact with snails, but may be present on food sources (plants). Although little to no information is available for herbicide toxicity to terrestrial snails, the herbicides used appear to be relatively non-toxic for invertebrates (Tu et al 2001 and SERA). Herbicides would be used across 655 acres, but only a portion of the acres treated would be directly impacted. The following factors would minimize the risk of contamination: 1) herbicide applied in small amounts; 2) specific methods of application such as thinline or stump treatments; 3) design criteria for herbicide use, e.g. timing to avoid rainfall. No other activities planned in this alternative would impact terrestrial snails.

Fire line construction may directly impact any snails present. Some may be crushed, but others

would be able to relocate. Snails are most abundant in the humus layer, leaf litter, rocks, and wood on the forest floor (Burch 1990). Because these species occur within leaf litter, some mortality could occur as a result of the burning. However, during dry periods (suitable for burning) most would remain in the humus or the moist bottom layer of the leaf litter (Royal BC Museum 2006) or under logs and rocks. These burns are intended to be "cool" or low intensity. Fire generally burns in a mosaic pattern; leaving patches of the cove forests untouched (Sellers 2009). Moist leaf litter generally does not burn and fire does not consume the majority of large woody debris, so refuge such as large logs and rocks would remain. These refuges are the most important habitat component and the main limiting factor for their success. If individuals are lost, remaining ones would be capable of repopulating as they are hermaphrodites and can fertilize themselves (Burch 1990).

Snails are not able to move quickly or over much distance, and do not generally move around except to find food and for reproduction (NatureServe 2012). Where complete burning of the leaf litter does take place, habitat conditions would temporarily become unfavorable. The loss of their protective cover would result in movements to unburned areas, exposing snails to predation. The unburned patches would continue to provide habitat within the affected areas. Another layer of leaf litter would return the next autumn. Burning does not greatly reduce snail diversity (Royal BC Museum 2006), and small snails such as these have been found in previously burned areas on the CNF. These impacts would be short-term and populations would persist in the area.

Less than three acres of habitat would be lost where temporary road construction occurs; negative impacts would be short term for temporary roads. Road maintenance would have some beneficial indirect effects; the addition of limestone gravel on the roads would provide an additional source of calcium for shell production (Burch and Pearce 1990). After implementation, the snails would use the area again. Installation of wildlife logs would provide cover for these snails. Waterhole construction, nest box installation, and other road activities would not cause any impacts.

CUMULATIVE EFFECTS

Combined with past and future burning activities, this alternative would have a negative cumulative effect on these snails. Burning would decrease suitable habitat in the analysis area. Prescribed fires generally burn in a mosaic pattern, thereby retaining suitable habitat for the species' recolonization of the burn areas over the long term. Burning combined with the proposed ESH would decrease suitable habitat in the analysis area due to the loss of large woody debris (cover), shading, increased sunlight, and elevated temperatures on the forest floor. Habitat would remain widely available in adjacent stands and across the analysis area and populations would persist, so these negative cumulative effects would not contribute to the decline of these species or their habitats across the CNF.

DETERMINATION OF EFFECT

Implementation of Alternative C ***may impact individuals but not likely to cause a trend to federal listing or loss of viability*** of glossy supercoil, bidentate dome, delicate vertigo, and cupped vertigo.

3.4 APPALACHIAN GENTIAN (*Gentiana austromontana*)

HABITAT RELATIONSHIPS

Appalachian Gentian is a Southern Appalachian endemic, ranging from eastern Tennessee, western North Carolina, southern West Virginia, and southwestern Virginia (NatureServe 2013). Its habitat associations include high elevation open forests, grassy balds, and the edges of roads, trails, and openings. Most occurrences are above 3500 feet. Appalachian gentian is known from 88 locations on the Cherokee National Forest. Some individuals would be impacted by ongoing maintenance (roads, trails, openings) under all alternatives. This plant was documented in 13 sites within the analysis area (McGuiness 2013). Five of these areas are proposed for treatment under at least one alternative. These treatments include shelterwood harvest, a multi-use trail connector, prescribed burning, and road decommissioning and associated activities at Little Stony road. Occurrences have been excluded from direct impacts as a result of management recommendations and decisions to ensure that individuals remain in the area.

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

No new activities are planned under this alternative. Populations would fluctuate based upon ongoing activities and available habitat conditions.

Appalachian gentian has been documented in close proximity to roads, trails, and power lines, within the Stony Creek analysis area. Current management activities would continue under this alternative. Individuals occurring in these areas would continue to be periodically disturbed by use and maintenance activities. Trampling, disturbance, and loss of individuals would occur as a result of these activities. Competition from native and invasive species would also contribute to population fluctuations over time; however, extirpation of these species from the area would not be expected. These disturbances help create and maintain suitable habitat conditions allowing plants to occupy these locations. Maintenance and use activities have been ongoing for many years and species have adapted to this level of disturbance at these sites.

There are no cumulative effects on Appalachian gentain associated with Alternative A because no new actions would be implemented under this alternative. Future habitat conditions within the Stony Creek area would be the result of natural processes, ongoing activities, and past and future projects.

DETERMINATION OF EFFECT

This alternative ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Appalachian gentian.

ALTERNATIVE B

DIRECT AND INDIRECT EFFECTS

Appalachian gentian was documented from three sites within the analysis area that have been proposed for shelterwood harvest under Alternative B. This plant is also known from ten other sites within the analysis area which are not impacted under this alternative. Shelterwood harvest would result in the loss of some individuals. Individuals located within riparian areas, leave clumps or outside the stand boundary would be protected from direct impacts. Habitat conditions would

be favorable for establishment within the treatment area following the project. Populations would be expected to increase after treatment for 2-5 years and then slowly decline as canopy cover is established. Plants would remain within the future stand where suitable habitat is present.

Other planned activities under Alternative B would not have direct impacts on Appalachian gentian because they are not known to occur within these areas. This plant occurs in a variety of habitat including forests, road sides, forest and trail edges, and canopy gaps. Crop tree release, road maintenance, invasive species control, and temporary roads created for implementation would provide improved habitat conditions and opportunities for establishment within the analysis area. Shelterwood harvest and temporary road construction would have some initial negative impacts, but create suitable habitat conditions following implementation. Populations would fluctuate as a result of activities and habitat conditions, but individuals would remain within the analysis area.

CUMULATIVE EFFECTS

This alternative, combined with past and future burning would have a positive cumulative effect on Appalachian gentian. Appalachian gentian is known to occur within the burn areas. Dormant season burns are not expected to directly impact individuals, but would reduce woody competition within these areas. This would improve habitat conditions by reducing plant competition from woody plants in the understory and midstory. Increase light resulting from reduced plant competition would improve flowering rates where suitable habitat is present. Establishment or expansion of existing populations could occur in areas where herbaceous plant competition is low to moderate. Future burning of this area would maintain suitable habitat conditions for these species within this project area.

DETERMINATION OF EFFECT

Alternative B ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Appalachian gentian.

ALTERNATIVE C

DIRECT AND INDIRECT EFFECTS

Appalachian gentian was documented from five sites within the analysis area that have been proposed for shelterwood harvest, a multi-use trail connector, and road decommissioning and trail work at Little Stony Road under Alternative C. This plant is also known from eight other sites within the analysis area which are not impacted under this alternative. Impacts from shelterwood harvest and road authorization are the same as Alternative B. Construction of the multi-use trail and activities at Little Stony Road would result in the loss of some individuals at these sites. Following implementation, suitable habitat would remain at both of these sites. Individuals adjacent to the impact area would recolonize these sites and trail maintenance activities would ensure that suitable habitat remains at the site. Appalachian gentian is not known to occur within the thinning, midstory, wildlife openings, or burn areas, but these activities would provide favorable habitat conditions for establishment following treatment. Impacts on habitat availability from the parking area, vernal ponds, and wildlife boxes are negligible. Implementation of Alternative C would result in some impacts, but maintain suitable habitat conditions for this species. Populations would fluctuate as a result of activities and available habitat conditions, but individuals would remain in the analysis area.

CUMULATIVE EFFECTS

Cumulative effects would be very similar to those described under Alternative B. Alternative C and other activities in the analysis area would create a mosaic of habitats capable of supporting many rare species. Alternative C creates less early successional habitat (335 acres) than Alternative B, but adds thinning (204 acres), midstory (116 acres) and prescribed burning (1057 acres) to improve habitat conditions for species such as Appalachian gentian that prefer more open forest conditions. Planned activities at Little Stony Road and the multi-use connecter trail would reduce human impacts in the Stony Creek drainage, which should benefit species that occupy this area. None of the additional treatments proposed under Alternative C overlap with other prescribed burns considered under cumulative effects (see Table 1). Management actions proposed under Alternative C, and past and future actions occurring on Forest Service lands are consistent with the RLRMP, and would ensure that suitable habitat remains within the Cherokee National Forest.

DETERMINATION OF EFFECT

Alternative C may ***impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Appalachian Gentian.

3.5 WHITELEAF SUNFLOWER (*Helianthus glaucophyllus*)

HABITAT RELATIONSHIPS

Whiteleaf sunflower is known from the South Mountains of North Carolina and the Blue Ridge Mountains of western North Carolina and eastern Tennessee, and from South Carolina, Alabama, and possibly Georgia (NatureServe 2013). Its habitat associations include mesic forest and woodlands at medium elevations. This also includes forest edges associated with roads, trails, and openings. Flowering rates for this species appear to be associated with light availability and tend to be higher where openings are present (canopy gaps, forest edges). Whiteleaf sunflower is known from 13 locations on the Cherokee National Forest. This plant was documented in one site within the analysis area (McGuiness 2013). This area is proposed for road authorization under at least one alternative. Some individuals would be impacted by ongoing use and maintenance (roads, trails, openings) under all alternatives.

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

No new activities are planned under this alternative. Populations would fluctuate based upon ongoing activities and available habitat conditions.

Whiteleaf sunflower has been documented in close proximity to an unauthorized road within the Stony Creek analysis area. Current management activities would continue under this alternative. Individuals occurring in this area would continue to be periodically disturbed by use and maintenance activities. Trampling, disturbance, and loss of individuals would occur as a result of these activities. Competition from native and invasive species would also contribute to population fluctuations over time; however, extirpation of these species from the area would not be expected. These disturbances help create and maintain suitable habitat conditions allowing plants to occupy this location. Maintenance and use activities have been ongoing for many years and species have adapted to this level of disturbance at the site.

There are no cumulative effects on whiteleaf sunflower associated with Alternative A because no new actions would be implemented under this alternative. Future habitat conditions within the Stony Creek area would be the result of natural processes, ongoing activities, and past and future projects.

DETERMINATION OF EFFECT

This alternative ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Whiteleaf sunflower.

ALTERNATIVE B

DIRECT AND INDIRECT EFFECTS

Whiteleaf sunflower is located along an existing road that would be authorized under this alternative. Authorization of 8.2 miles of roads would have no direct effects. These roads are already present on the ground and in use. Habitat conditions are not expected to change as a result of this decision. Whiteleaf sunflower is known to occur along the edge of one of these roads. Maintenance and use of this road results in some impacts (trampling, dislodging), but it also retains suitable habitat conditions at the site. Populations would remain, and fluctuate in response to habitat conditions and time from last disturbance.

Other planned activities under Alternative B would not have direct impacts on whiteleaf sunflower because they are not known to occur within these areas. This plant occurs in a variety of habitat including mesic forests, road sides, forest and trail edges, and canopy gaps. Crop tree release, road maintenance, invasive species control, and temporary roads created for implementation would provide improved habitat conditions and opportunities for establishment within the analysis area. Shelterwood harvest and temporary road construction would have some initial negative impacts, but create suitable habitat conditions following implementation. Impacts on habitat availability from the parking area, vernal ponds, and wildlife boxes are negligible. Populations would fluctuate as a result of activities and habitat conditions, but individuals would remain within the analysis area.

CUMULATIVE EFFECTS

This alternative, combined with past and future burning would have a positive cumulative effect on Whiteleaf sunflower. Whiteleaf sunflower is not known to occur within the burn areas. Dormant season burns are not expected to directly impact individuals, but would reduce woody competition within these areas. This would improve habitat conditions by reducing plant competition from woody plants in the understory and midstory. Increase light resulting from reduced plant competition would improve flowering rates where suitable habitat is present. Establishment could occur in areas where herbaceous plant competition is low to moderate and seed sources are available. Future burning of this area would maintain suitable habitat conditions for these species within this project area.

DETERMINATION OF EFFECT

Alternative B ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Whiteleaf sunflower.

ALTERNATIVE C

DIRECT AND INDIRECT EFFECTS

Direct and indirect impacts for whiteleaf sunflower would be the same as Alternative B. Despite differences in these alternatives, no additional known populations are impacted under this alternative. Alternative C impacts more acreage than Alternative C, which would provide additional opportunities for establishment where suitable habitat conditions are available.

CUMULATIVE EFFECTS

Cumulative impacts would be similar to Alternative B. Alternative C impacts additional acreage which would provide additional opportunities for establishment within the analysis area.

DETERMINATION OF EFFECT

Alternative C may ***impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Whiteleaf sunflower.

3.6 ROAN MOUNTAIN RATTLESNAKE ROOT (*Prenanthes roanensis*)

HABITAT RELATIONSHIPS

Roan Mountain rattlesnake root is endemic to the Southern Appalachian Mountains of North Carolina, Tennessee, and Virginia (NatureServe 2013). Its habitat associations include high elevation rich woods, grassy balds, and the edges of roads, trails, and openings. Roan Mountain rattlesnake root is known from 48 locations on the Cherokee National Forest. Some individuals would be impacted by ongoing maintenance (roads, trails, openings) under all alternatives. This plant was documented in seven sites within the analysis area (McGuiness 2013). Four of these areas are proposed for treatment under at least one alternative. These treatments include shelterwood harvest, temporary road construction, prescribed burning, and road decommissioning and associated activities at Little Stony road.

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

No new activities are planned under this alternative. Populations would fluctuate based upon ongoing activities and available habitat conditions.

Roan Mountain rattlesnake root has been documented in close proximity to roads, trails, power lines, and/or wildlife openings within the Stony Creek analysis area. Current management activities would continue under this alternative. Individuals occurring in these areas would continue to be periodically disturbed by use and maintenance activities. Trampling, disturbance, and loss of individuals would occur as a result of these activities. Competition from native and invasive species would also contribute to population fluctuations over time; however, extirpation of these species from the area would not be expected. These disturbances help create and maintain suitable habitat conditions allowing plants to occupy these locations. Maintenance and use activities have been ongoing for many years and species have adapted to this level of disturbance at these sites.

There are no cumulative effects on Roan Mountain rattlesnake root associated with Alternative A because no new actions would be implemented under this alternative. Future habitat conditions

within the Stony Creek area would be the result of natural processes, ongoing activities, and past and future projects.

DETERMINATION OF EFFECT

This alternative ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Roan Mountain rattlesnake root.

ALTERNATIVE B

DIRECT AND INDIRECT EFFECTS

Roan Mountain rattlesnake root was documented from three sites within the analysis area that have been proposed for shelterwood harvest and temporary road construction under Alternative B. This plant is also known from four other sites within the analysis area which are not impacted under this alternative. Impacts from shelterwood harvest would be similar to those described for Appalachian gentian. The temporary road would be constructed on an existing trail corridor. Temporary road construction would result in the loss of some individuals. Habitat conditions would be favorable along road banks and road edges allowing for the population to recover and expand within suitable habitat. Populations would gradually fall towards previous levels following treatment as surrounding vegetation shades out the temporary road. Following implementation, the temporary road would revert back to a trail. Plants are expected to remain along the trail corridor where suitable habitat is present.

Other planned activities under Alternative B would not have direct impacts on Roan Mountain rattlesnake root because they are not known to occur within these areas. These plants occur in a variety of habitat including open woods, road sides, forest and trail edges, and canopy gaps. Crop tree release, road maintenance, invasive species control, and temporary roads created for implementation would provide improved habitat conditions and opportunities for establishment within the analysis area. Shelterwood harvest and temporary road construction would have some initial negative impacts, but create suitable habitat conditions following implementation. Impacts on habitat availability from the parking area, vernal ponds, and wildlife boxes are negligible. Populations would fluctuate as a result of activities and habitat conditions, but individuals would remain within the analysis area.

CUMULATIVE EFFECTS

This alternative, combined with past and future burning would have a positive cumulative effect on Roan Mountain rattlesnake root. This plant is known to occur within the burn areas. Dormant season burns are not expected to directly impact individuals, but would reduce woody competition within these areas. This would improve habitat conditions by reducing plant competition from woody plants in the understory and midstory. Increase light resulting from reduced plant competition would improve flowering rates where suitable habitat is present. Establishment or expansion of existing populations could occur in areas where herbaceous plant competition is low to moderate. Future burning of this area would maintain suitable habitat conditions for these species within this project area.

DETERMINATION OF EFFECT

Alternative B ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Roan Mountain rattlesnake root.

ALTERNATIVE C

DIRECT AND INDIRECT EFFECTS

Roan Mountain rattlesnake root was documented from four sites within the analysis area that have been proposed for shelterwood harvest, temporary road construction, prescribed burning, road decommissioning and trail work at Little Stony Road under Alternative C. This plant is also known from three other sites within the analysis area which are not impacted under this alternative. Impacts from shelterwood harvest and temporary road construction were described under Alternative B. Plants located within the Griffith Branch burn would not be directly impacted as plants would be dormant when burning takes place. Burning would remove competing woody vegetation and increase light providing favorable conditions for this plant. Impacts from other activities associated with Alternative C would be similar to those described for Appalachian gentian. Implementation of Alternative C would result in some impacts, but maintain suitable habitat conditions for this species. Populations would fluctuate as a result of activities and available habitat conditions, but individuals would remain in the analysis area.

CUMULATIVE EFFECTS

Cumulative impacts would be similar to Alternative B. Alternative C impacts additional acreage which would provide additional opportunities for establishment within the analysis area.

DETERMINATION OF EFFECT

Alternative C may ***impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Roan Mountain rattlesnake root.

3.7 CAROLINA HEMLOCK (*Tsuga caroliniana*)

HABITAT RELATIONSHIPS

Carolina Hemlock is a Southern Appalachian endemic that occurs in western areas of Virginia, North Carolina and South Carolina, as well as parts of Georgia and Tennessee (NatureServe 2013). Its habitat associations include ridge tops, rocky bluffs, and open forests between 2000-4000 feet. This tree can also occur in rocky, cove forests and as scattered individuals with submesic to xeric upland hardwood forest. Most populations have been impacted by hemlock wooly adelgid (HWA), an exotic insect that is causing mortality throughout its range. The insect is present on the Cherokee National Forest and mortality is already occurring. The Forest has established a network of conservation areas where hemlock is being treated for this disease. These reserves are our best effort to keep the species viable on the forest. Mortality rates are expected to be very high for individuals located outside of these reserves and population declines are expected as a result of this disease.

Carolina hemlock is known from 56 locations on the Cherokee National Forest. Some individuals would be impacted by ongoing maintenance (roads, trails, openings) under all alternatives. This plant was documented in four sites within the analysis area (McGuiness 2013). Two of these areas are proposed for treatment under at least one alternative. These treatments include shelterwood harvest, a multi-use trail connector, and prescribed burning. Some occurrences have been excluded from direct impacts as a result of management recommendations and decisions to ensure that

individuals remain in the area. Any healthy Carolina hemlocks would be left as leave trees within treated stands.

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

No new activities are planned under this alternative. Populations would fluctuate based upon ongoing activities and available habitat conditions.

Carolina hemlock has been documented in close proximity to trails within the Stony Creek analysis area. Current management activities would continue under this alternative. Individuals occurring in these areas would continue to be periodically disturbed by use of the trail and maintenance activities (trimming of lower branches) Maintenance and use activities have been ongoing for many years and these individuals have been capable of withstanding this level of disturbance.

There are no cumulative effects on Carolina hemlock associated with Alternative A because no new actions would be implemented under this alternative. Future populations of this species within Stony Creek area would be determined by their ability to fight the Hemlock wooly adelgid. Three hemlock reserves are present within the Stony Creek watershed, but no Carolina hemlocks are present in these reserves. Population declines should be expected over time.

DETERMINATION OF EFFECT

This alternative ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Carolina hemlock.

ALTERNATIVE B

DIRECT AND INDIRECT EFFECTS

Carolina hemlock was documented from one site within the analysis area that has been proposed for shelterwood harvest under Alternative B. This plant is also known from three other sites within the analysis area which are not impacted under this alternative. No direct impacts would occur to Carolina hemlock under Alternative B. Only one individual was located and this plant has been excluded from the treatment area. Indirect impacts that would occur as a result of treatment in adjacent areas include: minor changes in microsite conditions (light, moisture), plant competition, and opportunities to expand or colonize additional areas that have become favorable habitat as a result of treatment. This plant would remain following treatment.

Other planned activities under Alternative B would not have direct impacts on Carolina hemlock because they are not known to occur within these areas. Most occurrences within the Stony Creek consist of one to few individuals. Other projects in the area that create canopy gaps or openings (shelterwood harvest, invasive species control, creation of temporary roads) would provide opportunities for establishment within the analysis area if seed sources are available. Populations would fluctuate as a result of activities and habitat conditions, but individuals would remain within the analysis area.

CUMULATIVE EFFECTS

Cumulative impacts are expected for *Carolina hemlock*. This species is known to occur within prescribed burn areas within the analysis area. Past and future dormant season burns would result in direct impacts to individuals such as burning of leaves and lower branches. Some mortality is

also possible; especially if individuals are weakened by hemlock woolly adelgid. Carolina hemlock occurs in dry habitats with a history of fire. Although direct impacts would occur, individuals are capable of recovering from impacts and may expand if habitat conditions are suitable for seed establishment. Therefore, cumulative impacts are expected to be minimal. Populations would fluctuate slightly (either positively or negatively) based upon available post-burn conditions. Future populations of this species within Stony Creek area would be determined by their ability to fight the Hemlock wooly adelgid. Three hemlock reserves are present within the Stony Creek watershed, but no Carolina hemlocks are present in these reserves. Population declines should be expected over time. The future viability of this species on the CNF may be in jeopardy as a result of HWA, but not due to the combined effects of projects in Alternative B and prescribed burning.

DETERMINATION OF EFFECT

Alternative B ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Carolina hemlock.

ALTERNATIVE C

DIRECT AND INDIRECT EFFECTS

Carolina Hemlock would incur some direct impacts associated with the Griffith Branch burn under Alternative C. One small sapling is located within the burn area. Implementation would result in the burning of needles and branches on the lower portion of this plant. Given the small size of the plant and presence of Hemlock Woolly Adelgid in the area, mortality is possible as a result of the burn, the disease, or the cumulative impact of both. Other known occurrences of Carolina hemlock are not impacted by other activities associated with Alternative C. Other projects in the area that create canopy gaps or openings (shelterwood harvest, invasive species control, creation of temporary roads, road decommissioning) would provide opportunities for establishment within the analysis area if seed sources are available. Populations would fluctuate as a result of activities and habitat conditions, but individuals would remain within the analysis area.

CUMULATIVE EFFECTS

Cumulative impacts would be very similar to Alternative B. Alternative C impacts additional acreage which would provide additional opportunities for establishment within the analysis area. The future viability of this species on the CNF may be in jeopardy as a result of HWA, but not due to the combined effects of projects in Alternative C and prescribed burning.

DETERMINATION OF EFFECT

Alternative C may ***impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Carolina Hemlock.

4.0 SUMMARY OF EFFECTS DETERMINATIONS

Table 7 summarizes the determinations of effect for each species.

TABLE3. DETERMINATIONS OF EFFECT FOR ALTERNATIVES

Scientific Name	Alternative A	Alternatives B & C
Speyeria diana	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Myotis leibii	No impact	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Paravitrea placentula	No impact	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Ventridens coelaxis	No impact	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Vertigo bollesiana	No impact	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Vertigo clappi	No impact	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Gentiana austromontana	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Helianthus glaucophyllus	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Prenanthes roanensis	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Tsuga caroliniana	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability

5.0 SIGNATURE OF PREPARERS

/s/ *Marcia S. Carter*
North Zone Fisheries Biologist
June 19, 2013

/s/ *Joseph H. McGuiness*
North Zone Wildlife Biologist
June 19, 2013

6.0 REFERENCES AND DATA SOURCES

Burch, J.B. and T.A. Pearce. 1990. Terrestrial Gastropoda. Pp. 201-309. In: Dindal Daniel L. (ed.), Soil biology guide. pp. 201-204.

Caldwell, Ron S. 2004. Manual for the Identification of Selected Land Snails of Nantahala and Pisgah National Forests. Cumberland Mountain Research Center, Lincoln Memorial University.

Harvey, M.J., J.S. Altenbach, and T.L. Best. 1999. Bats of the United States. Arkansas Game and Fish Commission and U.S. Fish and Wildlife Service.

Leftwich, Chris, Dr. S. Brewer, Dr. S. Studlar, E. Blyveis, J. Schewe, P. Roby, S. Samoray, and M. Gumbert. 2012. Botanical Surveys of the Stony Creek and Unaka Mountain Project Areas and Indiana Bat Surveys of the Burnett Gap, Lake Edge, and Long Branch Project Areas, North Zone Cherokee National Forest, Tennessee, 2012.

McGuiness, J.H. 2013. Project Area Plant Analysis by Survey Site for Stony Creek.

Mitchell, L.J. 2001. Sensitive Species, Terrestrial Animals, Cherokee National Forest. Cherokee National Forest, Cleveland, TN.

NatureServe. 2012. An online encyclopedia of life [web application]. Version 7.1. Arlington, Virginia, USA: Association for Biodiversity Information. Available: http://www.natureserve.org/.

NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life (web application). Version 7.1. NatureServe, Arlington, VA. Available at http://www.natureserve.org/explorer.

Stoehrel, C. 2012. Botanical Survey Site Documentation Form for Griffith Branch Stands in Compartment 67, Stands 2 and 7.

Stoehrel, C. 2013. Botanical Survey Site Documentation Form for Little Stony Connector, Compartment 66.

Stoehrel, C. and J. McGuiness. 2013. Botanical Survey Site Documentation Form for Griffith Branch Stands in Compartment 67, Stand 18.

Stoehrel, C. and J. McGuiness. 2013a. Botanical Survey Site Documentation Form for Stony Creek Shelterwood Unit #2.

Stoehrel, C. and J. McGuiness. 2013b. Botanical Survey Site Documentation Form for Stony Creek Thinning.

Stoehrel, C. and J. McGuiness. 2013c. Botanical Survey Site Documentation Form for Stony Creek Shelterwood Unit #1.

Syracuse Environmental Research Associates, Inc. 2003. Glyphosate – Human Health and Ecological Risk Assessment Final Report. Task No. 9. SERA TR 02-43-09-04a. Page 4-2.*

Syracuse Environmental Research Associates, Inc. 2004. Imazapyr - Human Health and Ecological Risk Assessment Final Report. Task No. 17. SERA TR 04-43-17-05b.*

Syracuse Environmental Research Associates, Inc. 2003. Triclopyr - Human Health and Ecological Risk Assessment Final Report. Task No. 13. SERA TR 02-43-13-03b.*

*All SERA available at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

Tu, Mandy, C. Hurd, & J.M. Randall. 2001. Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas. The Nature Conservancy, Wildland Invasive Species Team. Website available: http://tncinvasives.ucdavis.edu/handbook.html.

ATTACHMENT A

STONY CREEK PROJECT

CNF Sensitive Species 2001 List

Revised 1/30/13 MSC

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
Amphibians							
1a	*Desmognathus carolinensis*	Carolina Mountain Dusky Salamander	NC & TN; Iron Mtn. Gap (Unicoi Co.) to Pigeon River Valley (Cocke Co.)	Common in Unicoi, Greene, Cocke, Washington Counties	Seeps, springs, headwater streams, wet rock faces at lower elevations; more terrestrial at higher elevations; v. common in spruce/fir & northern hardwood forests; 900-6600 ft.	S	G4
1a	*Desmognathus santeetlah*	Santeetlah dusky salamander	NC & TN; Unicoi, Great Smoky, &Great Balsam Mtns. Monroe to Cocke Co.	4 records; Monroe Co. & SW Cocke Co.	Mid-high elevation seeps, stream headwaters, rock faces; 640-1805 m, primarily > 3200 ft.	S	G3G4Q
2a	*Eurycea junaluska*	Junaluska salamander	W NC & SW TN; Sevier Co. & Monroe Co., TN	8 Monroe Co. records Tellico, Bald & North Rivers, Citico & Slickrock Creeks; potentially Hiwassee River drainage; total 17 streams range wide	Large streams with sand-gravel substrate, large rocks & adjacent riparian forests. Low elevation, 1100-2000 ft.	S	G3
1a	*Plethodon aureolus*	Tellico salamander	Unicoi Mtns & adjacent valleys of TN and NC, between Little TN & Hiwassee Rivers	1 Monroe Co. record; also in Polk Co.	Hardwood and pine-hardwood forest; terrestrial breeder in leaf litter humus/rotting logs	S	G2G3
1a	*Plethodon teyahalee*	Southern Appalachian salamander	TN, NC, SC, GA; W of French Broad in Cocke Co. to Unicoi Mtns in Polk & Monroe Co.	Polk, Monroe, Cocke Cos.	Deciduous, mesic forest; terrestrial breeders (underground); <5000 ft.	S	G3
1a	*Plethodon welleri*	Weller's salamander	SW VA to NE TN & NW NC; Johnson, Carter & Unicoi Co.	11 TDEC records; Johnson, Carter, Unicoi Cos.	Spruce-fir, birch-hemlock and other mesic, rocky forests; boulderfields; grassy open areas; terrestrial breeder- moss mats & rotting logs; > 2200 ft.	S	G3
Birds							
1a	*Falco peregrinus*	Peregrine Falcon	US and CAN	2 TDEC records; hacking Big Bald 1987-89. Carter, Greene, Unicoi Cos.	Nests at ledges of vertical rocky cliffs. Feeds in fields, lakeshores, and river mouths.	S	G4
1a	*Haliaeetus leucocephalus*	Bald eagle	US and CAN	2 TDEC records; active nest at Parksville Lake 2006-7; hacking S. Holston Lake 1991-94; other recent nests Tellico Lake. Carter, Johnson, Unicoi, Sullivan, Monroe Washington, Polk Cos.	Nests in large "supercanopy" trees along lake & river shores. Prefers roosts in conifers & protected areas along open water in winter.	S	G5
1a	*Lanius ludovicianus migrans*	Migrant loggerhead shrike	ME to MN south, from GA to AR; OK, TX; CAN: PE to MB	O TDEC records; occurs throughout E. Tennessee; Greene Co. near Forest	Low elevation crop & grasslands and old fields with scattered trees, shrubs, posts	S	G4T3Q
Fish							

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
1a	*Cottus baileyi*	Black sculpin	SH	20 occ in tributaries to Beaverdam and Laurel Crs	Cool and cold water rivers and streams to headwater springs. Rare in Streams over 15m wide. Utilize riffles, runs, and pools with gravel, stone, and boulder substrates. Mod. To high gradient.	S	G4Q
1a	*Etheostoma acuticeps*	Sharphead darter	N	1 occ. Nolichucky R #1	Large creeks to medium rivers, moderate gradient, cool warm water	S	G2G3
1a	*Etheostoma brevirostrum*	Holiday Darter	C	3 occ Conasauga R #1 & #2; Jack's R	Large streams to medium rivers, moderate gradient, low elevation	S	G2
1a	*Etheostoma vulneratum*	Wounded darter	LT, FB	2 occ Citico Cr #4 & Tellico R #1	Small to large rivers, low to moderate gradient, low to moderate elevations	S	G3
1a	*Ichthyomyzon greeleyi*	Mountain brook lamprey	H,O, FB, N, SH	4 occ Hiwassee R #4; & #5; Spring Cr.#1 and Ocoee R #1	Small streams to small upland rivers, moderate to high gradient	S	G4
1a	*Percina burtoni*	Blotchside logperch	H, SH, LT	2 occ. Spring Cr #1 & Hiwassee R #1	Large streams to small rivers, moderate gradient, low elevation	S	G2G3
1a	*Percina palmaris*	Bronze darter	C	3 occ Conasauga R #1 & #2; Jack's R	Small to medium rivers, moderate gradient, low elevation.	S	G4
1a	*Percina squamata*	Olive darter	H, FB, N, W, O	1 occ. Hiwassee R. #4;	Small to medium rivers, moderate to high gradient, moderate elevations	S	G3
1a	*Percina williamsi*	Sickle darter	SH, W, FB	0 occ	Large streams to medium rivers, moderate gradient, low to moderate elevations.	S	G2
1a	*Phenacobius crassilabrum*	Fatlips minnow	P, FB, N, W, SH	2 occ Nolichucky R #1 & #3	Large streams to medium rivers, moderate to high gradient, moderate elevation	S	G4
7a	*Phoxinus tennesseensis*	Tennessee dace	O, H, LT, N, W, SH;	40 occ. O=13; H=15; LT=11; SH=1	1st order spring-fed streams (1-2 m wide) of R&V region & mountain fringes; low to moderate gradients, low to moderate elevation	S	G3
Insects and Millipedes							
1a	*Cheumatopsyche helma*	Helma's net-spinning caddisfly	Known from at least one occurrence in 8 states: NH, PA, WV, KY, NC, TN, AL, AR; most recently discovered in Arkansas and in Abrams Cr in the GSMNP, TN	1 occ. Big Lost Cr (Hiwassee)	Large streams, low gradient, low elevation	S	G3
1a	*Dixioria fowleri*	A millipede	VA, TN, Laurel Fork drainage in VA; Beaverdam Crk in TN	1 occ., Holston Mtn near Backbone Rock	Leaf litter, deciduous forests	S	G2
1a	*Gomphus consanguis*	Cherokee clubtail	Known from at least one occurrence in 6 states: VA, NC, SC, TN, GA, AL; 15 known occurrences	2 occ. (TDEC records); known from Polk and Sullivan Counties	Small, spring-fed streams, mod to high gradient	S	G3
1a	*Gomphus viridifrons*	Green-faced clubtail	Known from 16 states and 1 Canadian province with as many as 6 occurrences in some states; some populations are protected from habitat degradation	1 occ. Chestoa, Nolichucky R. 2001	Small-large rivers, moderate gradient	S	G4
1a	*Macromia margarita*	Mountain river cruiser	Known from at least one occurrence in 6 states: VA, NC, SC, TN, GA, AL; at least 13 occurrences; occurs in Blount Co., TN	0 occ.	Small streams to large rivers, rocky with silt deposits	S	G3

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
1a	*Megaleuctra williamsae*	Smokies needlefly	Known from at least one occurrence in 4 states: VA, NC, SC, TN; at least 3 occurrences in VA; known from Mt. Rogers & GSMNP	0 occ.	Springs and seeps at high elevations (>4000 feet).	S	G2
1a	*Ophiogomphus incurvatus alleghaniensis*	Allegheny Snaketail	Known from at least one occurrence in 4 states: WV, VA, TN, AL; at least 5 occurrences in TN; considered a subspecies of O. incurvatus by some.	2 occ. Monroe, Polk Cos. (TDEC records)	Spring-fed Piedmont streams	S	G3T2T3
1a	*Ophiogomphus edmundo*	Edmund's snaketail	Known from at least one occurrence in 3 states: TN, NC, GA; probably restricted to the Conasauga River in TN	1 occ. Conasauga R.	Large streams, low gradient, low elevation	S	G2
1a	*Ophiogomphus incurvatus*	Appalachian snaketail	Known from at least one occurrence in 4 states: PA, TN, NC, GA	1 occ Sheeds Cr #1	Small streams, low gradient	S	G3
4a	*Speyeria diana*	Diana fritillary	WV to AL	39 TDEC records, Monroe, Cocke, Greene, Carter, Johnson, Sullivan, Unicoi, Washington Cos.	Mature mesic forests, edges & grassy openings; caterpillar host is Viola sp.	S	G3G4
Mammals							
1a	*Corynorhinus rafinesquii*	Rafinesque's big-eared bat	OH to MO, south to FL and LA; OK, TX	2 TDEC records; Cocke & Monroe Cos.	Caves & mine portals; summer roosts in hollow trees, under loose bark, & abandoned buildings; forages primarily in mature forest	S	G3G4
1a	*Microtus chrotorrhinus carolinensis*	Southern rock vole	Mountains of MD, NC, TN, VA, WV	0 TDEC records; likely Monroe, Carter, Unicoi Cos.	Cool, damp coniferous and mixed forest; moist/mossy talus and logs at higher elevations	S	G4T3
6a	*Myotis leibii*	Eastern small-footed bat	ME to OH south, from SC to AL; AR, MO, OK; CAN: ON, QC	18 TDEC records, Polk, Monroe, Cocke, Greene, Unicoi, Carter, Johnson, Sullivan Cos.	Bridges, cliffs, mine portals, buildings; summer roosts buildings, hollow trees, loose bark	S	G3
2a	*Sorex palustris punctulatus*	Southern water shrew	Mountains of MD, NC, PA TN, VA, WV	4 TDEC records Monroe Co.	Swift rocky streams in northern & cove hardwoods; often hemlock, mossy rocks, rhododendron; riparian dependent	S	G5T3
Mussels							
1a	*Fusconaia barnesiana*	Tennessee pigtoe	H, LT, N, FB, W, SH	2 occ Hiwassee R. #4 & #5; LT habitat is inundated by Tellico Res.	Small to medium rivers, moderate to high gradient, low elevation	S	G2G3
1a	*Lasmigona holstonia*	Tennessee Heelsplitter	H, FB	1 occ Hiwassee R #4	Small streams to small rivers, low to moderate gradient, low elevation	S	G3
1a	*Lasmigona subviridis*	Green floater	W	0 occ	Large streams to small rivers, low gradient, low elevation	S	G3
1a	*Lexingtonia dolabelloides*	Slabside pearlymussel	H,N,FB,P,LT	2 occ Hiwassee R. #4 & #5	Small streams to large rivers, moderate to high gradient, low elevation	S{C}	G2
1a	*Pleurobema oviforme*	Tennessee clubshell	H,SH,FB,N,LT	3 occ Hiwassee R #4 & #5; Citico Cr #1	Large streams, low gradient, low elevation	S	G2G3
1a	*Strophitus connasaugaensis*	Alabama creekmussel	C	2 occ. Conasauga R #1 & #2	Large streams, low gradient, low elevation	S	G3
1a	*Villosa nebulosa*	Alabama rainbow	C	2 occ. Conasauga R #1 & #2	Large streams, low gradient, low elevation	S	G3

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
1a	*Villosa vanuxemensis umbrans*	Coosa creekshell	C	2 occ. Conasauga R #1 & #2	Small and large streams, low gradient, low elevation	S	G4T2
Snails							
1a	*Pallifera hemphilli*	Black mantleslug	MI, NC, TN, GA,VA	0 TDEC records; Field Museum & CNF records Polk (2), Carter (5) Cos.	Spruce fir and mesic forests with moist litter, downed wood and rock cover; high elevation	S	G4
6a	*Paravitrea placentula*	Glossy supercoil	VA, TN, NC, KY, GA Off-forest Cocke Co.; unk location Sullivan Co.	0 TDEC records; Field Museum & CNF records Polk(4), Monroe(2), Carter(2), Unicoi(1) Cos.	Leaf litter of deciduous forests and streamside forests with moist litter, downed wood & rock cover.	S	G3
1a	*Patera archeri*	Ocoee covert	Polk County , TN	4 CNF records Polk County	Leaf litter under rock ledges in ravines; Ocoee River drainage endemic	S	G1
6a	*Ventridens coelaxis*	Bidentate dome	NC, TN, KY, VA Off-CNF & unk locations Carter, Johnson, Sullivan Cos.; Unicoi Co.	Field Museum & CNF records; Unicoi (1), Carter (5) and Johnson (3) Cos.	Mesic deciduous forest, mid-high elevation	S	G3
6a	*Vertigo bollesiana*	Delicate vertigo	ME south to TN, NC (17 states, 3 Canadian provinces)	2 records Monroe Co.; 1 Field Museum record Johnson County	Rocky habitats in rich coves, acidic coves, other deciduous forests with downed wood	S	G4
6a	*Vertigo clappi*	Cupped vertigo	KY, TN, VA, WV	5 TDEC records Monroe Co.; TDEC record Carter Co.	Cool, wooded, mesic bedrock, out crops and cliffs	S	G1G2
Non-vascular Plants							
7a	*Acrobolbus ciliatus*	A liverwort	Mountains of NC, TN, SC, GA. AK, Japan, Taiwan, and India. Monroe Co.	1 Record	On rock in moist ravines, spray cliffs, cascading streams, and spruce/fir forests; Riparian dependent except when in the spruce/fir forest zone.	S	G3?
7a	*Aneura maxima (=A. sharpii)*	A liverwort	Mountains of VT, south to NC and TN	1 Records	Humus or gravelly soil at base of wet outcrops, along streams, and waterfalls. Mostly riparian dependent	S	G1G2
7a	*Aspiromitus appalachianus*	A hornwort	TN, NC, SC	Undocumented records have been reported.	On rock in streams. Riparian dependent.	S	G1
7a	*Bartramidula wilsonii*	Dwarf apple moss	Macon & Jackson Counties, NC and Monroe County, TN	0 Records. Known from Monroe County however site is undocumented.	Wet, acidic rock in the mtns, especially road cuts. Also on spray cliffs and in humid gorges. Mostly riparian dependent.	S	G3?
1a	*Bazzania nudicaulis*	A liverwort	Mountains of VA, TN, and NC	2 locations; Roan Mountain	On rock and bark of *Abies fraseri, Picea rubens, Betula lutea, Prunus pennsylvanica,* and *Sorbus americana* in spruce/fir forests.	S	G2G3
1a	*Brachydontium trichodes*	Peak moss	Europe, Mount Rainier, NH, NC, and TN	Unknown # on Roan Mountain	Moist, shady, acidic rock, especially sandstone; rocky seepage along mountain trails.	S	G2
7a	*Buxbaumia minakatae*	Hump-backed Elves	Nova Scotia, MA, NY, MI, VT, VA, NC and Japan	0 Records	Swampy areas; habitats occupied by *Nowellia, Lophocolea*, and *Tetraphis;* rotten logs or stumps; found on elm, ash and yellow birch logs.	S	G2G3
7a	*Cephalozia macrostachya ssp australis*	A liverwort	NC to MS	0 Records	On soil in rock crevices along streams. Riparian dependent.	S	G4T1
1a	*Cephaloziella massalongi*	A liverwort	Europe, VT, TN, and NC	0 Records	Rock crevices and soil above 5,500'. Often with copper or sulphur deposits.	S	G2G3

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
7a	*Cheilolejeunea evansii*	A liverwort	NC, SC, AL, and TN. Monroe Co.	1 Record	On tree bark in humid gorges. Variety of mesic to dry-mesic hardwoods including *Quercus* spp., *Liriodendron tulipifera, Nyssa sylvatica, Carya* spp., *Liqyuidambar styraciflua, Fraxinus* spp., and *Ilex opaca*. The moss *Fissidens subbasilaris* is nearly a constant associate.	S	G1
7a	*Chiloscyphus appalachianus*	A liverwort	KY, NC, SC, and TN. Monroe Co.	1 Record	On wet rock, usually near cascades or waterfalls. Riparian dependent.	S	G1G2
7a	*Diplophyllum apiculatum var taxifoliodes*	A liverwort	NC, TN The variety *taxifolioides* is known from several locations in NC and from Mt. LeConte in TN.	0 Records.	On moist soil or rocks at moderate to high elevations. *Diplophyllum* collected below 3,000 feet is likely to be *D. apiculatum* (Hicks 1992*)*. The variety is thought to be a hybrid of *D. apiculatum* and *D. taxifolioides* (Shuster 1974).	S	G5T1Q
1a	*Diplophyllum obtusatum*	A liverwort	Newfoundland, MN, mountains of NC & TN	0 Records.	In crevices of rock outcrops in spruce/fir forests; >5,500 ft. Always associated with damp, shaded rocks. It is also known to occur within mixed mesophytic forest in NC (Shuster 1974).	S	G2?
7a	*Ditrichum ambiguum*	A moss	CA, MT, NC, NH, NY, OR, VT, WA; BC, QC, SK	0 Records.	On bare soil of moist banks of roads or streams in wooded, upland, or montane habitats. Also acidic coves.	S	G3?
7a	*Drepanolejeunea appalachiana*	A liverwort	Mountains of VA, TN, NC, SC, and GA; PR	4 Records.	On rock and the bark of trees and shrubs along streams, mixed mesophytic forest, and in humid gorges. Most often found on *Kalmia Rhododendron, Clethra,* and *Ilex.* Substrates for the CNF pops include rock, *Quercus alba*, and *Betula allegheniensis.*	S	G2?
7a	*Entodon concinnus*	Lime entodon	NC, TN; AB, BC, NS	0 Records.	On moist calcareous rock.	S	G4G5
7a	*Fissidens appalachensis*	Appalachian pocket moss	NC and TN. Monroe Co.	1 Record.	In rock crevices submerged in swift running, shallow water. Riparian dependent.	S	G2G3
7a	*Frullania appalachiana*	A liverwort	Mountains of TN, NC, GA, and SC	1 Record.	Usually on the bark of hardwoods (*Acer spicatum, Betula allegheniensis, Sorbus americana*) above 3,500 ft. in spruce/fir zone. Also known from mesic forests and escarpment gorges on the bark of *Castanea dentata* and *Liriodendron tulipifera*.	S	G1?
1a	*Frullania oakesiana*	A liverwort	Northern Europe, Japan, and Mountains of VT to NC and TN	0 Records.	Tree bark in spruce/fir forests.	S	G3?
7a	*Homaliadelphus sharpii*	Sharp's homaliadelphus	Japan, Vietnam, Mex; MO VA, NC, and TN	0 Records.	Vertical surfaces and ledges of calcareous cliffs and boulders. Dry mafic or calcareous rocks in gorges.	S	G3
7a	*Hydrothyria venosa*	An aquatic lichen	CA to MT and Canada; Appalachians from Canada to TN & NC. Monroe Co.	1 Record	On rock substrates in clear, cold mountain streams. Riparian dependent.	S	G3
7a	*Lejeunea blomquistii*	A liverwort	Mountains of NC, TN, and GA. Monroe Co.	2 Records.	Rock and bark in humid gorges, and dead trees or vertical rock faces of spray cliffs.	S	G1G2
1a	*Lejeunea dimorphophylla*	A liverwort	The Caribbean; coastal plain of FL and NC	This has proven to be *Lejeunea ulicina* ssp. *bullata*.	On bark of trees in the outer coastal plain. Riparian dependent.	S	G2G3

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
1a	*Leptodontium excelsum*	Grandfather Mountain leptodontium	VA, TN, NC, and GA	Unknown # on Roan Mountain	Bark of trees in high elevation, spruce/fir forests.	S	G2
7a	*Leptohymenium sharpii*	Mount LeConte moss	TN, NC, and SC	0 Records.	On shaded, moist or wet rock (often cliffs and waterfalls) and within hemlock/hardwood cove forests. Elevation ranged from 1900- 5400'.	S	G1
7a	*Lophocolea appalachiana*	A liverwort		see Chiloscyphus appalachianus	See Chiloscyphus appalachianus	S	G1G2?
7a	*Marsupella emarginata var. latiloba*	A liverwort	Range unknown	0 Records.	Moist rocks in humid gorges, waterfall spray zones, wet rock & seeps along streams, or humid microclimates at high elevation. Riparian dependent.	S	G5T1T2
7a	*Megaceros aenigmaticus*	A hornwort	NC, TN, and GA. Monroe and Cocke Co's.	31 Records (often abundant in areas where found).	Shaded rocks in small streams and springs, or spray cliffs. Riparian dependent.	S	G2G3
7a	*Metzgeria fruticulosa (= M. temperata)*	A Liverwort	Asia, Europe; PNW US; VA, NC, and TN	Undocumented Record, Roan Mountain	Rock and bark of trees from spruce/fir zone to hemlock/hardwood forests above 3000'.	S	G2Q
7a	*Metzgeria furcata var. setigera*	A liverwort	NC and SC, possibly TN	0 Records.	In humid gorges or on damp, shaded rocks in spruce/fir forests.	S	G4T1
7a	*Metzgeria uncigera*	A liverwort	PR; SE coast to mountains of NC	0 Records.	On *Rhododendron* bark in mountains.	S	G3
7a	*Nardia lescurii*	A liverwort	VA, WV, KY, TN, NC, SC, and GA. Monroe Co.	3 Records	Low elevations in mountains, on peaty soil over rock near shaded streams. Riparian dependent.	S	G3?
7a	*Pellia appalachiana*	A liverwort	MN, NC, SC, TN, and GA. Monroe and Polk Co's.	3 Records.	Permanently damp or wet sites and moist outcrops, usually near waterfalls. Mostly riparian dependent	S	G1?
7a	*Plagiochila austinii*	A liverwort	NH and VT to NC and TN	0 Records.	On shaded, moist rock outcrops in the mountains	S	G3
7a	*Plagiochila caduciloba*	A liverwort	Mountains of TN, NC, SC, and GA. Monroe Co. (Historic record from Greene County)	2 Records.	Damp, shaded rock faces, usually along streams in mountain gorges and on spray cliffs; 1000-4900 ft. Riparian dependent.	S	G2
7a	*Plagiochila echinata*	A liverwort	Mountains of TN, NC, and SC. Monroe and Polk Co's.	5 Records.	Damp, shaded rock faces and crevices in mountain gorges, above cascades and near waterfalls. Riparian dependent.	S	G2
7a	*Plagiochila sharpii*	Sharp's leafy liverwort	TN, NC, SC, and GA	0 Records.	Shaded, moist rocks in humid gorges. Riparian dependent.	S	G2G3
7a	*Plagiochila sullivantii var spinigera*	A liverwort	Mountains of VA, WV, NC, SC, and TN. Monroe Co.	1 Record.	Moist, shaded rock outcrops, under cliff ledges, and in rock crevices; spray cliffs and spruce/fir forests; > 2500 ft.	S	G2T1
7a	*Plagiochila sullivantii var sullivantii*	Sullivant's leafy liverwort	Mountains of VA, WV, KY, TN, NC, SC, and GA. Monroe Co.	1 Record.	Moist, shaded rock outcrops, cliff ledges and rock crevices; spray cliffs and spruce/fir forests; > 2500 ft.	S	G2T2
7a	*Plagiochila virginica var caroliniana*	A liverwort	VA, NC, SC, and TN	2 Records, no varietal info.	On moist rock near waterfalls; humid gorges and rocky banks of shaded streams. Riparian dependent. Generally at lower elevations.	S	G3T2
7a	*Plagiochila virginica var virginica*	A liverwort	WV, to NC, SC, TN, GA, and MS	2 Records, no varietal info.	On shaded rock along streams and moist rock faces, especially limestone. Riparian dependent. Generally at lower elevations.	S	G3T3

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
7a	*Plagiomnium carolinianum*	Carolina plagiomnium	TN, NC, SC, and GA	0 Records.	Moist, granitic or humus covered rock, especially on cliff ledges near streams or waterfalls; rocks or streambanks in humid gorges. Riparian dependent.	S	G3
7a	*Platyhypnidium pringlei*	A moss	Mexico, AZ; NC, SC, and suspected in TN	0 Records.	Attached to acidic rock in running water, permanent seeps, or spray cliffs of waterfalls in hemlock/hardwood forests. Riparian dependent.	S	G2
1a	*Polytrichum appalachianum*	Appalachian haircap moss	TN and NC	0 Records.	High elevation rocky summits, rock outcrops, and shrub balds.	S	G3
7a	*Porella wataugensis*	Watauga porella	KY, TN, NC, and SC. Monroe Co.	3 Records	Rock faces in humid gorges & wet rock near small streams above inundation. Riparian dependent.	S	G2
7a	*Radula sullivantii*	A liverwort	Mountains of NC, SC, TN, and GA	1 Record.	Shaded rock outcrops near streams and waterfalls in mountain gorges. Riparian dependent.	S	G2
7a	*Radula voluta*	A liverwort	Europe, South America; mountains of NC and TN. Monroe Co.	1 Record	Shady rock faces in spray areas around waterfalls. Riparian dependent.	S	G3
7a	*Riccardia jugata*	A liverwort	Mountains of NC and TN. Monroe and Polk Co's.	3 Records.	On moist wood and humus in mesic areas and humid gorges.	S	G1G2
1a	*Sphenolobopsis pearsonii*	A liverwort	Europe, Africa, Asia, Atlantic and Pacific Islands, Pacific NW; NC and TN	Roan Mountain (Undocumented)	On rock and bark of *Abies fraseri, Picea rubens, Prunus pennsylvanica,* and *Sorbus americana* in spruce/fir forests.	S	G2
7a	*Sticta limbata*	A foliose lichen	Canada to CA; mountains of NC and TN	0 Records.	Bark of hardwoods in high elevation northern hardwood forests	S	G3G4
7a	*Taxiphyllum alternans*	Japanese yew-moss	Asia; MD to FL, NC, and LA	0 Records.	Soil, humus, or bark in wet, swampy areas; on limestone in the spray area of waterfalls. Riparian dependent. .	S	G3?
7a	*Tortula ammonsiana*	Ammons' tortula	Africa; WV, NC, and TN	0 Records.	Cliff overhangs and crevices with seepage in rich hardwood forests. Riparian dependent.	S	G2?
Vascular Plants							
7a	*Aconitum reclinatum*	Trailing white monkshood	South and central mountains of NC, PA, TN, VA, WV. Carter Co.	1 Record.	Rich forest habitats on seepage slopes, boulderfields, streambanks, and coves at high elevations, associated with mafic rock.	S	G3
1a	*Aster georgianus*	Georgia aster	AL, FL, GA, NC. Suspected in SE TN	0 Records	Dry, rocky, open woods and roadsides in areas with a history of frequent fire; Likely associated with historic post or blackjack oak woodlands.	S	G2G3
7a	*Berberis canadensis*	American barberry	PA to IL, south to AL, GA; IL, MO. Monroe, Johnson, Sullivan, Washington, Carter, and several ridge and valley counties.	0 Records	Open rocky woods, openings, and streambanks, usually over mafic or calcareous rock; occurring in thin soil. Historic habitats were fire maintained.	S	G3
1a	*Botrychium jenmanii*	Dixie grapefern	MD to FL; TN, AL, MS, LA. Monroe, Hamblen, Putnam Co's.	0 Records	Dry to moist forests; open, grassy areas; and disturbed areas.	S	G3G4
7a	*Buckleya distichophylla*	Piratebush	Mountains of NC, TN, VA. Carter, Cocke, Greene, Sullivan, Unicoi, Washington Co's.	14 Records.	Open, dry, rocky woods and bluffs, typically calcareous-shaley soils; Known sites occur between 1900-3300 ft.	S	G2
7a	*Calamagrostis cainii*	Cain's reed grass	Mountains of NC, TN. Sevier Co.	0 Records	High elevation rocky summits and disturbed areas 4000-6000 ft.	S	G1

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
7a	*Cardamine clematitis*	Small mountain bittercress	Mountains of AL, NC, SC, TN, VA. Carter, Johnson, Unicoi, Washington, Monroe, Sevier Cos.	13 Records	Wet, rocky areas; springs, seeps, and streambanks; moss or moist soil; > 3,500'; Mostly riparian dependent.	S	G2G3
7a	*Carex misera*	Wretched sedge	Mountains of GA, NC, TN. Blount, Sevier, Carter, Unicoi	3 Records	Medium to high elevation cliffs, balds and rocky areas	S	G3
7a	*Carex roanensis*	Roan sedge	GA, KY, NC, TN, VA. Carter, Johnson, Unicoi, Cocke, Sullivan	37 Records	Mesic forests; often associated with birch and beech at high elevations.	S	G1
7a	*Cimicifuga rubifolia*	Appalachian bugbane	AL, IL, IN, KY, TN. Monroe, Sullivan, & several Ridge and Valley cos.; Primary Cumberland Plateau in TN.	0 Records	River bluffs, ravines, and rich cove forests over talus and rocky calcareous soils; typically north facing slopes; 800-1500 ft.	S	G3
7a	*Collinsonia verticillata*	Stoneroot	MD to GA; OH, KY, TN. Monroe, McMinn, Blount, Sevier, Johnson, and several counties to west.	3 Records	Rich forests in moist coves to dry oak forests over mafic or calcareous rock.	S	G3
7a	*Coreopsis latifolia*	Broadleaf tickseed	Mountains of GA, NC, SC, TN. Polk, Carter, Greene	6 Records	Rich, moist cove and slope forests 1,500 to 4,500 ft. Flowering triggered by canopy gaps.	S	G3
7a	*Danthonia epilis*	Bog oat-grass	GA, NC, NJ, SC, TN. Cocke	0 Records	Seeps around rock outcrops in the mountains. Riparian dependent.	S	G3?
7a	*Delphinium exaltatum*	Tall larkspur	OH, PA south to TN, NC; AL, MO, ME. Mostly Ridge and Valley Co's, but reported from Cocke Co.; Known from the Blue Ridge in NC.	0 Records;	Dry to moist habitats over mafic rock, usually in full or partial sun (grassy balds or forest edges). Also rich woods (and edges of woods), rocky slopes, semi-open woodlands, glades and prairie openings.	S	G3
7a	*Diervilla rivularis*	Riverbank bush-honeysuckle	Mountains of AL, GA, NC, TN. Unicoi, Washington, Polk, and some Ridge and Valley Co's.	12 Records	Bluffs, rock outcrops, and riverbanks	S	G3
7a	*Fothergilla major*	Large witchalder	AL, AR, GA, NC, SC, TN. Polk, Sevier, Greene, and some west of Blue Ridge	3 Records	Dry ridge top and bluff forests of moderate elevations.	S	G3
7b	*Gentiana austromontana*	Appalachian gentian	Mountains of NC, TN, VA, WV. Carter, Greene, Johnson, Sullivan, Unicoi, Washington Cos.	88 Records	High elevations in open forests, grassy balds, and along roads and trails.	S	G3
7a	*Geum geniculatum*	Bent avens	Mountains of NC, TN. Carter Co.	10 Records	High elevation peaks, seeps, wet boulderfield forests, grassy balds, cliff bases, and stream banks.	S	G2
7a	*Glyceria nubigena*	Great Smoky Mountain mannagrass	Mountains of NC, TN. Sevier.	0 Records	Moist to soggy ground at higher elevations, especially seepage areas on heath balds and high ridges and miry places in spruce-fir forests	S	G2
7b	*Helianthus glaucophyllus*	Whiteleaf sunflower	AL, NC, SC, TN. Carter, Greene, Johnson, Unicoi Cos.	13 Records	Mesic forests and woodlands at medium elevations. Flowering associated with increased light.	S	G3
7a	*Heuchera longiflora var. aceroides*	Maple-leaf alumroot	Range for H. longiflora is AL, KY, NC, OH, TN, VA, and WV. No published range info for variety. Cocke, Greene Cos.	11 Records	Moist ravines and rich cove forests, especially over mafic or calcareous rock.	S	G4T2Q

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
7a	*Hymenophyllum tayloriae*	Taylor's filmy fern	NC, SC, TN, GA. Sevier, Fentress, Overton.	0 Records	Humid gorges, moist ceilings of rock grottoes and spray cliffs. Riparian dependent.	S	G1G2
7a	*Hypericum graveolens*	Mountain St. Johnswort	Mountains of NC, TN. Sevier, Unicoi, Carter, Johnson.	3 Records	High elevation grassy balds and forest openings.	S	G3
7a	*Hypericum mitchellianum*	Blue Ridge St. Johnswort	Mountains of NC, TN, VA, WV. Unicoi, Carter, Cocke, Greene, Johnson, Sevier, Blount, Monroe.	9 Records	Grassy balds, seeps, and forest openings.	S	G3
7a	*Ilex collina*	Longstalked holly	NC, VA, WV. Suspected in TN	0 Records	Wetlands, seeps, or streambanks >2,000 ft. often in association with *Tsuga canadensis, Betula lenta, Ilex montana, Picea rubens*, and *Rhododendron maximum*. Also moist, rocky slopes in northern hardwood or mixed spruce/hardwood forests.	S	G3
7a	*Juglans cinerea*	Butternut	Central and eastern US and southeastern CAN. All Blue Ridge counties and scattered throughout TN.	15 Records	Moist, rich forests especially along rivers in bottomlands and floodplains.	S	G3G4
7a	*Lilium grayi*	Gray's lily	Mountains of NC, TN, VA. Carter and Johnson Co's.	6 Records	Bogs, seeps, grassy balds, moist forest edges, and wet meadows at medium to high elevations.	S	G3
7a	*Lysimachia fraseri*	Fraser's yellow loosestrife	Regional endemic of AL, GA, NC, SC, TN; KY, IL. Polk, Sevier, Cocke, Hamilton, and a few counties in west TN.	10 Records	Forest edges, road banks, Along streams and rivers, and thin soil near rock outcrops. Locally abundant in the Ocoee River Gorge. Dependent upon cyclical natural disturbances to maintain open conditions.	S	G2
7a	*Minuartia godfreyi*	Godfrey's stitchwort	Regional endemic AL, AR, FL, NC, SC, TN. Carter, Johnson.	0 Records	Wet ditches, meadows, seeps, streams banks, and springs; associated with calcareous soils. Riparian dependent.	S	G1
7a	*Monotropsis odorata*	Sweet Pinesap	DE to FL, AL, KY, TN, WV; Centered in Appalachians. Polk, Monroe, Blount, Sevier, Cocke, Greene, and a few counties west.	10 Records	Dry to mesic pine and mixed pine/hardwood forests.	S	G3
7a	*Penstemon smallii*	Small's beardtongue	Mountains of AL, GA, NC, SC, TN. Polk, Cocke, Greene, Washington, Unicoi, Carter, and several counties west.	0 Records	Woodlands, cliffs, glades, and roadsides.	S	G3
1a	*Platanthera integrilabia*	White fringeless orchid	VA to GA, KY to AL, MS. Polk, Monroe and several Cumberland Plateau counties	2 Records	Forested wetlands with open or semi-open canopy. Wet, flat, boggy areas at the head of streams or seepage slopes. Often found in association with *Sphagnum* and *Osmunda cinnamonea, Woodwardia areolata*, and *Thelyptris novaboracensis,* in acidic muck or sand, and in partially, but not fully shaded areas.	S	G2G3
1a	*Potamogeton tennesseensis*	Tennessee pondweed	OH, PA, TN, VA, WV. Polk, Monroe, Blount and counties west	1 Record	Slow moving streams and rivers. Riparian dependent.	S	G2

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
7b	*Prenanthes roanensis*	Roan Mountain rattlesnake root	Mountains of NC, TN, VA. Polk, Sevier, Greene, Unicoi, Carter, Johnson	48 Records	High elevation rich woods, grassy balds, and forest openings.	S	G3
7a	*Pycnanthemum beadlei*	Beadle's mountain mint	Mountains of southwest VA to GA, TN. Carter	0 Records	Forests and woodland borders.	S	G2G4
1a	*Rosa obtusiuscula*	Appalachian Valley rose	TN endemic. Only known collection from Cocke Co.	0 Records; not tracked by TDEC; NY Botanical Garden Database lists one record (1897) in Cocke County near French Broad River between Paint Rock and Del Rio.	Listed by TN Natural Heritage (1999) as a rare endemic, known from wooded slopes and riverbanks. Taken off after Rare Plant Advisory Committee meeting (1999) until taxonomic issues are resolved. It could be *Rosa palustris*. At this point it is considered to be "State Historic".	S	G1G3Q
7a	*Rugelia nudicaulis*	Rugel's Indian plantain	Mountains of NC, TN. Cocke, Sevier, Blount	0 Records	Spruce/fir and northern hardwood forest openings	S	G3
7a	*Saxifraga caroliniana*	Carolina saxifrage	Mountains of GA, NC, TN, VA, WV. Carter, Cocke, Johnson Cos.	4 Records	Moist rock outcrops and cliffs; wet soil at the base of rocks; cool, shaded, rocky woods. Almost always in steep terrain and often in areas misted by spray from nearby waterfalls or in areas where water trickles down the rocky slopes.	S	G2
7a	*Scutellaria arguta*	Hairy skullcap	GA, KY, NC, TN, VA. Unicoi	0 Records	High to mid elevation forests and moist talus slopes	S	G2?Q
7a	*Scutellaria saxatilis*	Rock skullcap	CT to IN, south to AL, GA, SC, AR. Polk, Blount, Unicoi, Carter, Johnson, Cocke, Greene	49 Records	Rocky, dry to mesic forests and open areas	S	G3
1a	*Sedum nevii*	Nevius' stonecrop	AL, GA, TN. Polk	9 Records all restricted to the Ocoee River Gorge.	Shaded, rocky bluffs and cliffs	S	G3
1a	*Sida hermaphrodita*	Virginia fanpetals	KY, MD, OH, PA, TN, VA, IN, MI, Ontario. Cocke, Washington, Claiborne	0 Records	Sandy or rocky riverbanks	S	G2
7a	*Silene ovata*	Blue Ridge catchfly	AL, AR, GA, IL, IN, KY, MS, NC, SC, TN, VA. Polk, Sevier, Cocke, Greene, Unicoi and west.	4 Records	Mid elevations over mafic or calcareous soils. Rich cove and oak/hickory forests.	S	G2G3
7a	*Stachys clingmanii*	Clingman's hedge-nettle	AL, IN, MD, NC, SC, TN, WV. Monroe, Sevier, Blount, Cocke, Unicoi	10 Records	Rich boulderfields, cove, northern hardwood, and spruce/fir forests, and clearings at high elevations.	S	G2Q
7a	*Thaspium pinnatifidum*	Cutleaved meadow parsnip	AL, GA, KY, NC, OH, TN, VA. Greene, Cocke, Hamilton	1 Record	Forests and woodlands over calcareous rock	S	G3?
7a	*Thermopsis mollis var. fraxinifolia*	Ashleaf goldenbanner	Mountains of GA, NC, SC, TN; AL. Polk, Monroe, Blount, Greene	29 Records	Openings and ridges in dry woodlands. Often on road banks.	S	G4? T3?
7a	*Trillium rugelii*	Southern nodding trillium	Mtns & Piedmont of AL, GA, NC, SC, TN. Carter, Cocke, Unicoi, Washington, Polk, Blount, Sevier	6 Records	Rich forests and coves often over mafic or calcareous substrates.	S	G3
7a	*Trillium simile*	Sweet white trillium	Mountains of GA, NC, SC, TN. Polk, Monroe, Sevier, Blount, Cocke	Several Records, not in database.	Rich soils of slopes or coves over mafic or calcareous rock.	S	G3
7b	*Tsuga caroliniana*	Carolina hemlock	Mountains of GA, NC, SC, TN, VA. Carter, Johnson, Sullivan, Unicoi, Washington	56 Records	Ridge tops, rocky bluffs and open forests. Generally dry conditions.	S	G3

ATTACHMENT B

List for determining the Project Review Code (PRC) for each TES Species

Last changed 5/9/08 MSC

1a: Project is located out of the species known range, or suitable habitat does not exist in the project area.

Determination of Effect: No Impact.

2a: All requisite habitat has been identified and excluded from disturbance associated with the project. Therefore, the project is expected to have no effects regardless of the number and location of individuals in the area affected by the project.

Determination of Effect: No Impact.

3a: The project is being implemented for the benefit of the species, and is expected to have totally beneficial effects regardless of the number and location of individuals in the area affected by the project.

Determination of Effect: Beneficial effect.

4a: It is assumed that the species is present. Additional information on the number and location of individuals is not needed to improve the design and/or application of mitigation to reduce adverse effects, or to allow a better assessment of effects to viability of the population.

5a: The species is already covered by a current site-specific inventory for the project area and additional inventories are not needed.

6a: Inventory methods are not technically or biologically feasible and effective for providing substantial information on the number and location of individuals. It is assumed that the species is present.

7a: A site-specific inventory was conducted, but the species was not found in the project area.

Determination of Effect: No Impact.

7b: A site-specific inventory was conducted, and the species was found in the project area.